Immersive TelePresence
Video Design and Deployments for Enterprise

BRKEVT-2312

Cisco Immersive TelePresence AGENDA

- Introduction to Immersive TelePresence
- Selecting and evaluating rooms
- System Components
- Scheduling
- Media Services for TelePresence
- Planning and preparing the network
  - Is the network ready?

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Immersive TelePresence – what's that ?

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Immersive TelePresence – what's that ?

From WIKIPEDIA The Free Encyclopedia :

- **Immersive technology** refers to technology that blurs the line between the physical world and digital or simulated world, thereby creating a sense of immersion.
- **Immersion** is the state of consciousness where an immersant's awareness of physical self is diminished or lost by being surrounded in an engrossing total environment; often artificial.

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Immersive TelePresence – what's that ?

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Immersive TelePresence – what's that ?

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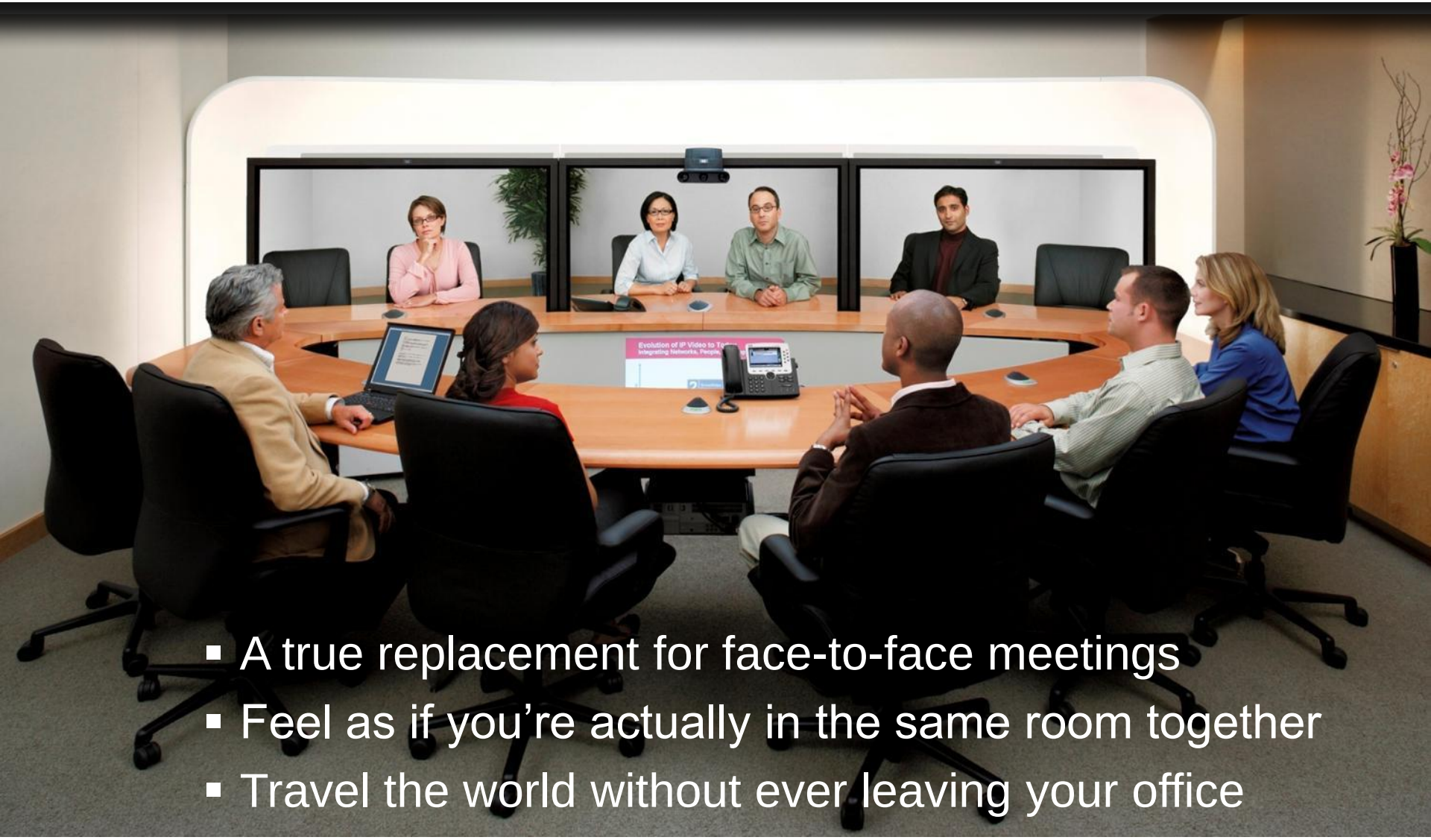
Cisco Immersive TelePresence

What It Is Today...



- A true replacement for face-to-face meetings
- Feel as if you're actually in the same room together
- Travel the world without ever leaving your office

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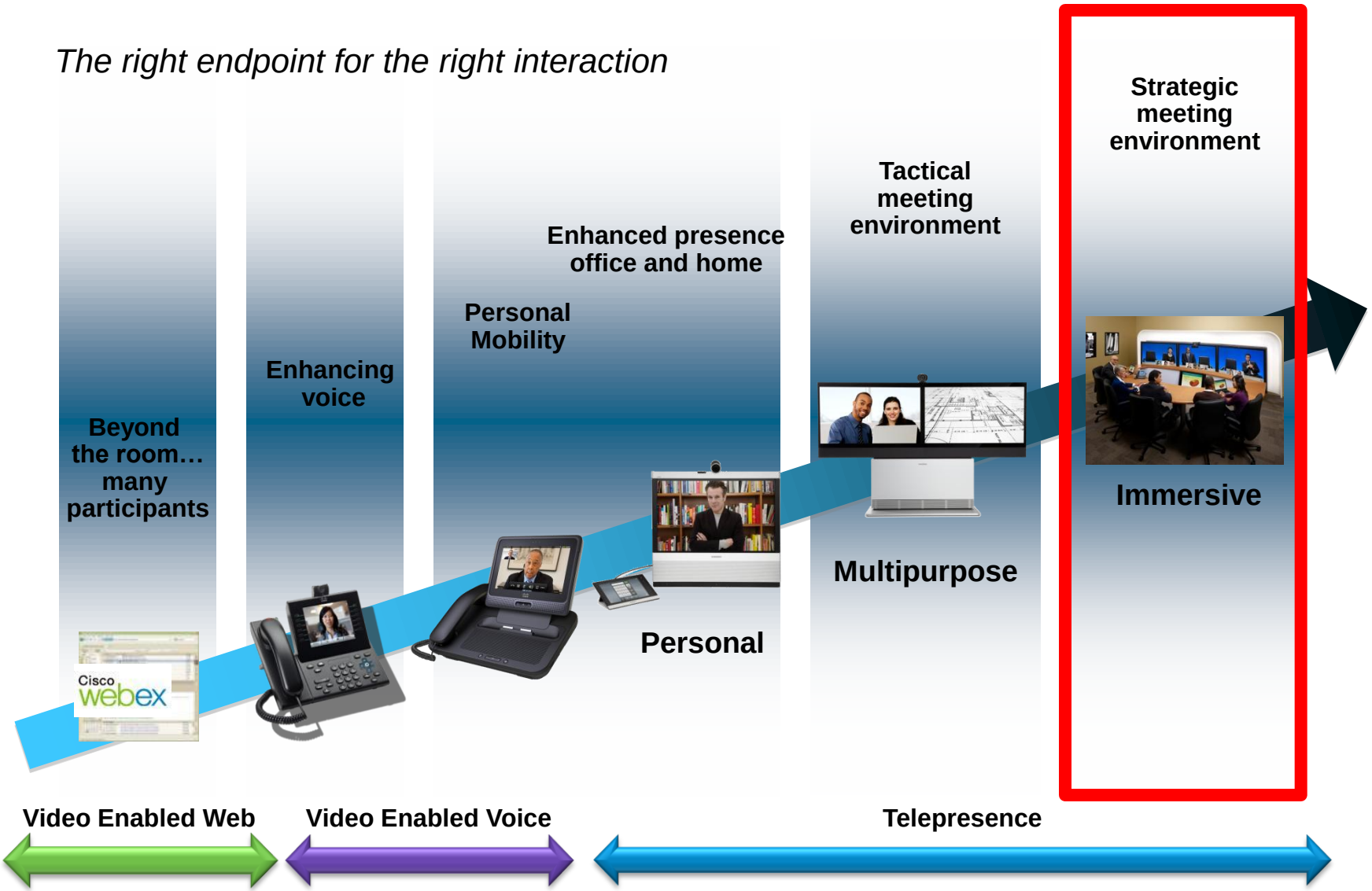
Cisco TelePresence Immersion Curve

The right endpoint for the right interaction



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Cisco TelePresence

Combined Endpoint Portfolio

TANDBERG is now part of Cisco.

Immersive

For dedicated rooms with optimized and customized environments for face-to-face virtual communications and collaboration

Multipurpose

An optimum telepresence experience for the widest range of group conference rooms and environments

Personal

For telepresence experiences in personal office, at home for telecommuting applications, and while traveling

Solution Platforms

Core Cisco TelePresence components for customized and vertical applications

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Cisco TelePresence – Immersive

CTS 3000

First Cisco TelePresence Offering

- Award Winning Product
- First Native 1080p TelePresence
- Native 1080p Cameras
- 65’ Native 1080p Plasmas
- 3 x 2-Seat Table Segments (6 people)

Cisco TelePresence Experience

- Life Size
- Spatial Audio
- Auto Collaborate for Data Video Sharing
- One Button to Push for Scheduled Meetings
- Audio Add-in

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Cisco TelePresence - Immersive
CTS 3200

Multi-Row room design

- Same front row as CTS 3000 (6 people)
- Extra 2nd row table (12 people)
- Room for “spectators” along back wall
- No raised seating

Designed to fit in large rooms

- Minimum room size 31’w x 23’d x 8’h
- Min 26’ depth for “spectator” seats
- **Additional data display required for back row viewing**
- 10’ ceiling height for optional data display

Full “TelePresence Experience”

- Inherited all features from Award Winning CTS 3000
- All participants in the room have a full “seat at the table”
- Spatial audio microphone at each seat, tuned 1080p video

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Cisco TelePresence - Immersive

CTS 3210 & CTS 3010

Upgrade to Triple Screen Systems

Complete New Systems as CTS 3010 and CTS 3210

Upgrade Kits Available for CTS 3000 and CTS 3200

Improved Auto Collaborate Playback

Upgraded LCD Display

Simplified Design & Installation

Faster Installation

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Cisco TelePresence - Multipurpose & Personal

- **For more information** on designing and deploying these TelePresence solutions**...**

- ...please consult session „Personal and Multipurpose TelePresence Video Design and Deployments for Enterprise” (**BRKEVT-2921**)

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Cisco CTS Product Family

Personal	Multipurpose		Immersive	
CTS 500 1–2 Seats	CTS 1100 2 Seats	CTS 1300 6 Seats	CTS 3000/3010 6 Seats	CTS 3200/3210 18 Seats

Scheduling and Operation

- Multipoint-48 segments
- One-button scheduling server
- Intercompany services

Planning and Design

- Network readiness
- Room readiness (30X0/32X0)
- Groupware integration

Services and Solutions

- SD and HD interoperability
- Recording studio
- End-to-end encryption

Implementation and Support

- Installation
- Monitoring, support, helpdesk
- Financing

Cisco CTS – Personal TelePresence

CTS 500

- Personal TelePresence
  - Compact Solution
  - Ease of Installation
- 1080p Native Resolution
- Wideband Audio
- Multi-Purpose 37” LCD
  - Embedded Speaker
  - Embedded Microphone Array
  - Digital Signage Support in Idle
- Cisco Unified IP Phone 7975G
- Auto Collaborate
  - With PiP or External Display
- Audio Add-In

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Cisco CTS – Multipurpose TelePresence

CTS-1100

- **Multi-Purpose Room**
  - 2 seats for TelePresence
  - 4+ seats for Audio Conference
- **Multi-Purpose Display**
  - TelePresence + General Display
  - Content Sharing
  - DMP Integration

- **All Participants Remain Life Size**
- **1080p Native Resolution**
- **Wideband Audio**
- **Auto Collaborate**
- **Single Screen Bandwidth**

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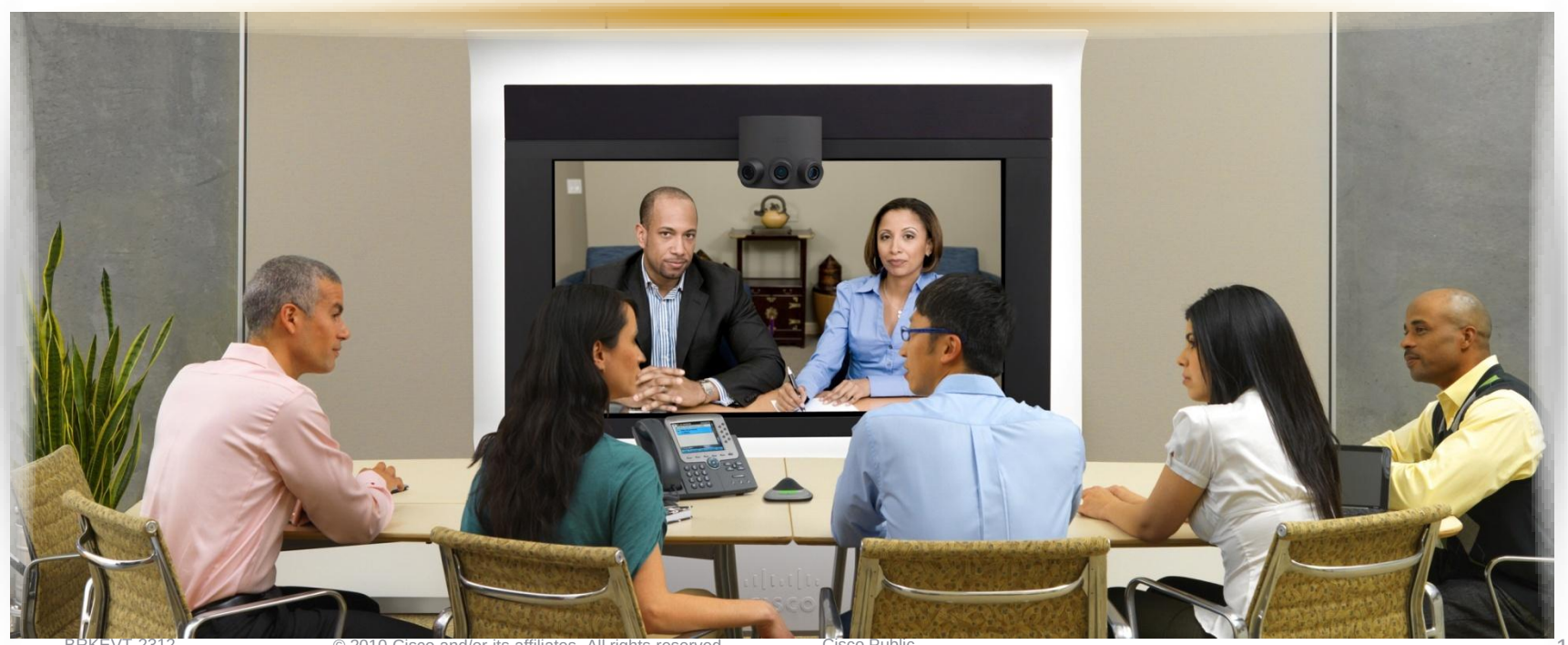
Cisco CTS - Multipurpose TelePresence

CTS-1300

- **Multi-Purpose Room**
  - 6 seats for TelePresence
  - 10+ seats for general meeting
- **Multi-Purpose Display**
  - TelePresence + General Display
  - Content Sharing
  - DMP Integration

- **All Participants Remain Life Size**
- **1080p Native Resolution**
- **Wideband Audio**
- **Auto Collaborate**
- **Single Screen Bandwidth**



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Flexibility of the Immersive Room eXperience

Which is a “proper” Cisco Immersive TelePresence room?

Answer: All of them!

Think “Continuity” not Repeatability

- Continuity more accurately captures the idea that elements necessary to facilitate a great Immersive TelePresence eXperience, such as light, sound and wall color, should have a close degree of consistency, without implying that rooms be ***identical*** at each endpoint.
- Cisco Immersive TelePresence aims to create an environment which is optimal for the technology yet allows the customer enough flexibility to personalize the space appropriate to their corporate brand and the cultural norms of global locations.

Cisco TelePresence in the Enterprise

Worki with Workplace resources within the Enterprise !

Room Design

Select and evaluate rooms based on:
environment, acoustics, illumination, room temperature and aesthetics

Allow Enough Time!

Challenges: Size, Lighting and Material

Consistent: Size, Lighting and Material

Enough Power Circuits

+

HVAC

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Cisco Immersive TelePresence in the Enterprise

Room Design

Environment

Size and Orientation
Temperature (HVAC)
Architecture

Illumination

Color Temperature
Light Intensity
Position of Lighting

Acoustic

Sound Quality
Ambient Noise
Reverberation

Aesthetics

Look and Feel of Rooms
Color
Branding

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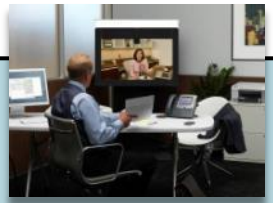
Remediation Cost Range vs. Imapact to Experience

Immersive TelePresence Environments

		Potential Cost	Impact to Experience
Size & Orientation	Selecting a room that is already suitable for TelePresence will minimize costs. Choose rooms that are in appropriate locations, and adequate sized	MEDIUM	MEDIUM
Illumination	Basic lighting can be inexpensive with good results. This is one area where it's worth spending a little extra. Great lighting is key for great video	LOW - MEDIUM	HIGH
Acoustics	A few acoustic remediation's can create a much more pleasing sound to a room. Basic panels are inexpensive but custom panels are costly.	LOW	MEDIUM
Aesthetics	The appearance of the room can require little investment and improve overall experience, locally and remotely	LOW	HIGH
HVAC	Look for interior rooms with minimal HVAC remediation requirements Adding VAV or control systems can usually suffice but a new air handler can be high cost.	MEDIUM - HIGH	HIGH

Cisco Immersive TelePresence in the Enterprise

Room Design

CTS 500	CTS 1100	CTS 1300	CTS 3010	CTS 3210
				
Recommendations			Requirements	
Multipurpose Environment			Dedicated Environment	
Recommended Range of Light Level			Specific Light Levels	Specific Light Levels & Layout
Standard Office Noise			Acoustic Paneling Recommended	Acoustic Paneling Required
Glass Walls and Windows (with Window Dressing)			Minimal Glass Walls or Large Windows	
Standard Office HVAC			Adequate Cooling & Management	
Room Size (Min. Max.) / Power / Network				

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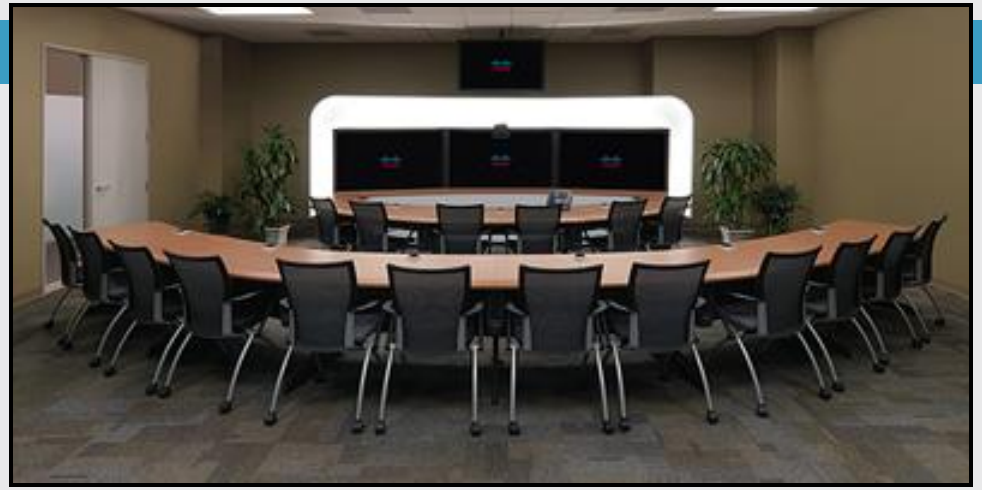
Cisco Immersive TelePresence Room Details

For Your Reference

Cisco TelePresence System 3210

- Dedicated Environment
- 14-18 Person Capacity
- Group / Team Collaboration

Details



Room Size **Minimum**	Lighting	Acoustics	Power	HVAC	Design
Depth / Width / Height 23’ x 31’ x 8’ 7m x 9.44m x 2.44m	300-400 lux Facial Light (vertical plane) Twice the facial light or less for Shoulder Light (work surface)	Ambient Noise 45dBA SPL NC30 Reverberation 150-700ms Acoustic Panel on Side walls	3.19kW Max 6 dedicated circuits Participant convenient ports consume additional power	Independent Room Control Typical Cooling 12,800 BTU/Hr	Aesthetic Continuity highly desirable For best video quality: - Avoid high contrast elements such as very dark or bright colors - Avoid glossy finishes - Avoid clutter

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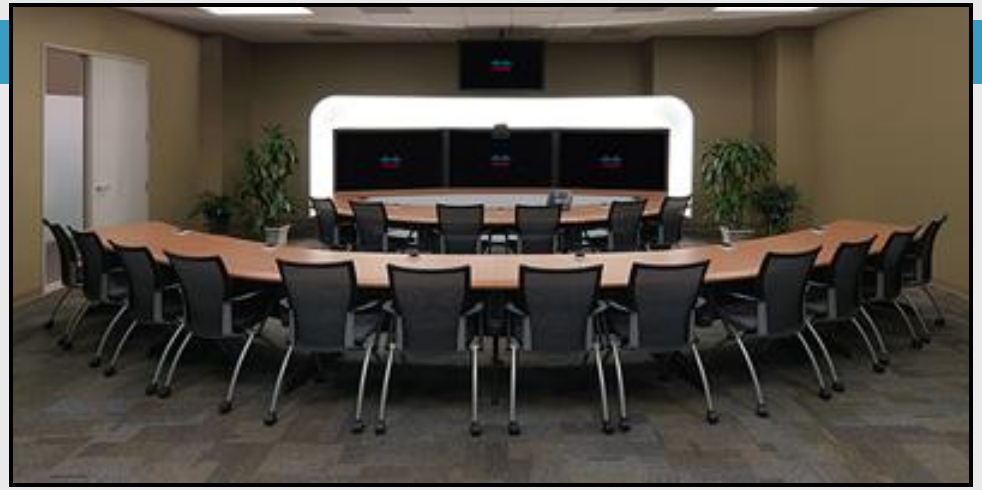
Cisco Immersive TelePresence Room Details

For Your Reference

Cisco TelePresence System 3200

- Dedicated Environment
- 14-18 Person Capacity
- Group / Team Collaboration

Details



Room Size Minimum	Lighting	Acoustics	Power	HVAC	Design
Depth / Width / Height 23’ x 31’ x 8’ 7m x 9.44m x 2.44m	300-400 lux Facial Light (vertical plane) Twice the facial light or less for Shoulder Light (work surface)	Ambient Noise 45dBA SPL NC30 Reverberation 150-700ms Acoustic Panel on Side walls	4.79kW Max 6 dedicated circuits Participant convenient ports consume additional power	Independent Room Control Typical Cooling 14,600 BTU/Hr	Aesthetic Continuity highly desirable For best video quality: - Avoid high contrast elements such as very dark or bright colors - Avoid glossy finishes - Avoid clutter

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Cisco Immersive TelePresence Room Details

For Your Reference

Cisco TelePresence System 3010

- Dedicated Environment
- 6 Person Capacity
- Group / Team Collaboration

Details

Room Size **Minimum**	Lighting	Acoustics	Power	HVAC	Design
Depth / Width / Height 15’ x 20’ x 8’ 4.6m x 6m x 2.44m	300-400 lux Facial Light (vertical plane) Twice the facial light or less for Shoulder Light (work surface)	Ambient Noise 45dBA SPL NC30 Reverberation 150-700ms Acoustic Panel on Side walls	2.96kW Max 4 dedicated circuits Participant convenient ports consume additional power	Independent Room Control Typical Cooling 9,500 BTU/Hr	Aesthetic Continuity highly desirable For best video quality: - Avoid high contrast elements such as very dark or bright colors - Avoid glossy finishes - Avoid clutter

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Cisco Immersive TelePresence Room Details

For Your Reference

Cisco TelePresence System 3000

- Dedicated Environment
- 6 Person Capacity
- Group / Team Collaboration

Details

Room Size **Minimum**	**Lighting**	**Acoustics**	**Power**	**HVAC**	**Design**
Depth / Width / Height 15’ x 20’ x 8’ 4.6m x 6m x 2.44m	300-400 lux Facial Light (vertical plane) Twice the facial light or less for Shoulder Light (work surface)	Ambient Noise 45dBA SPL NC30 Reverberation 150-700ms Acoustic Panel on Side walls	4.56kW Max 4 dedicated circuits Participant convenient ports consume additional power	Independent Room Control Typical Cooling 11,200 BTU/Hr	Aesthetic Continuity highly desirable For best video quality: - Avoid high contrast elements such as very dark or bright colors - Avoid glossy finishes - Avoid clutter

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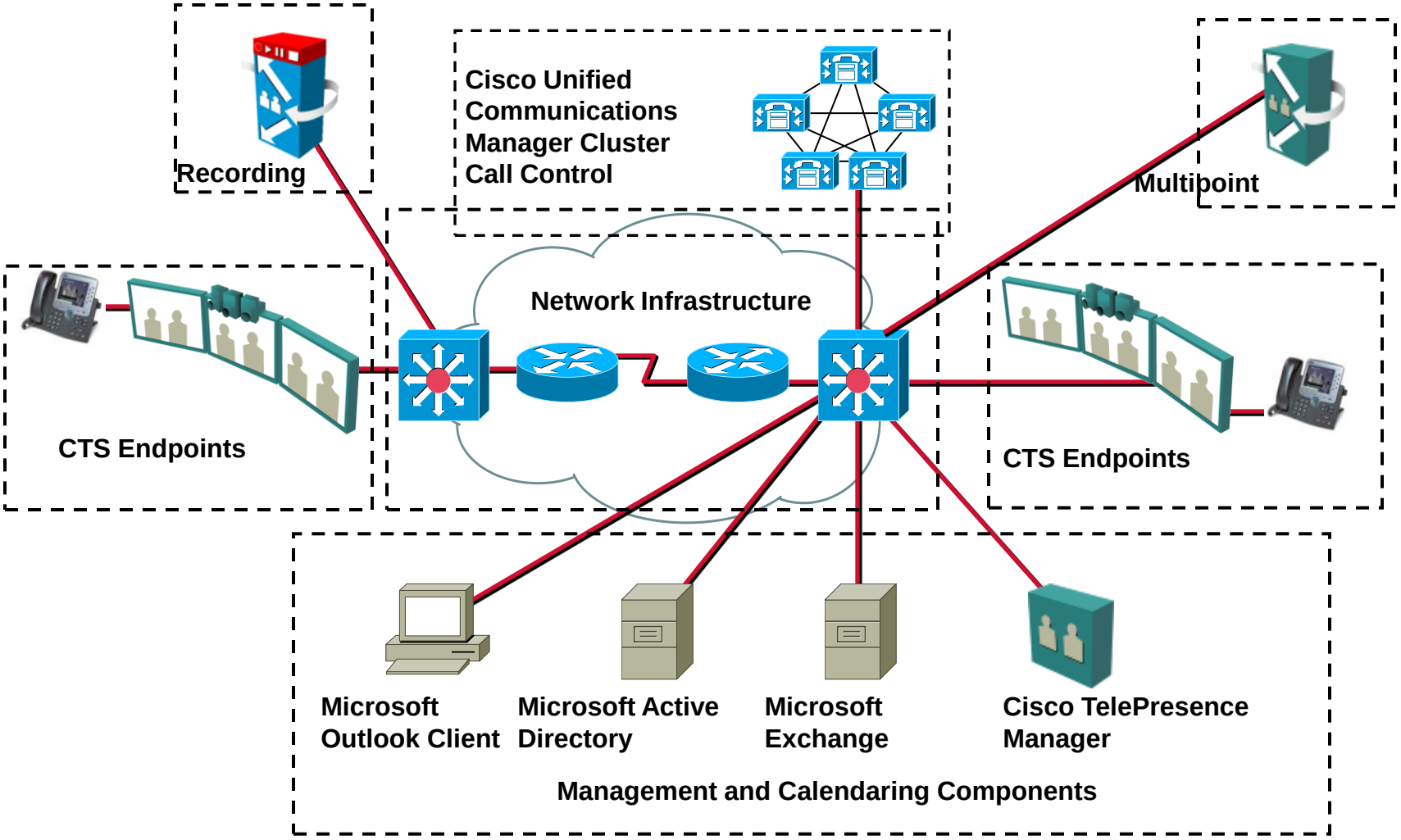
Cisco Immersive TelePresence

System Components



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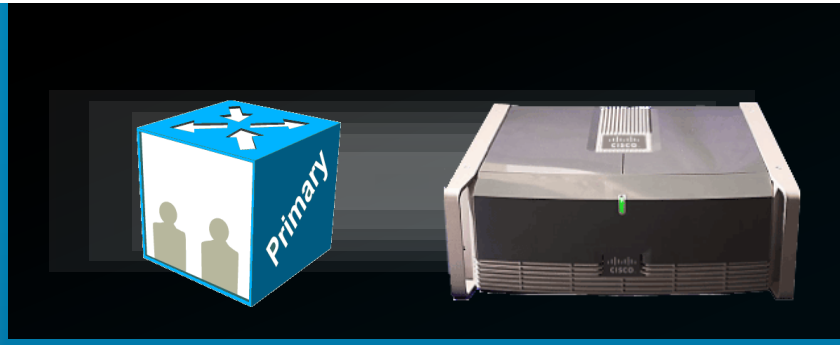
CTS System Overview
Codec

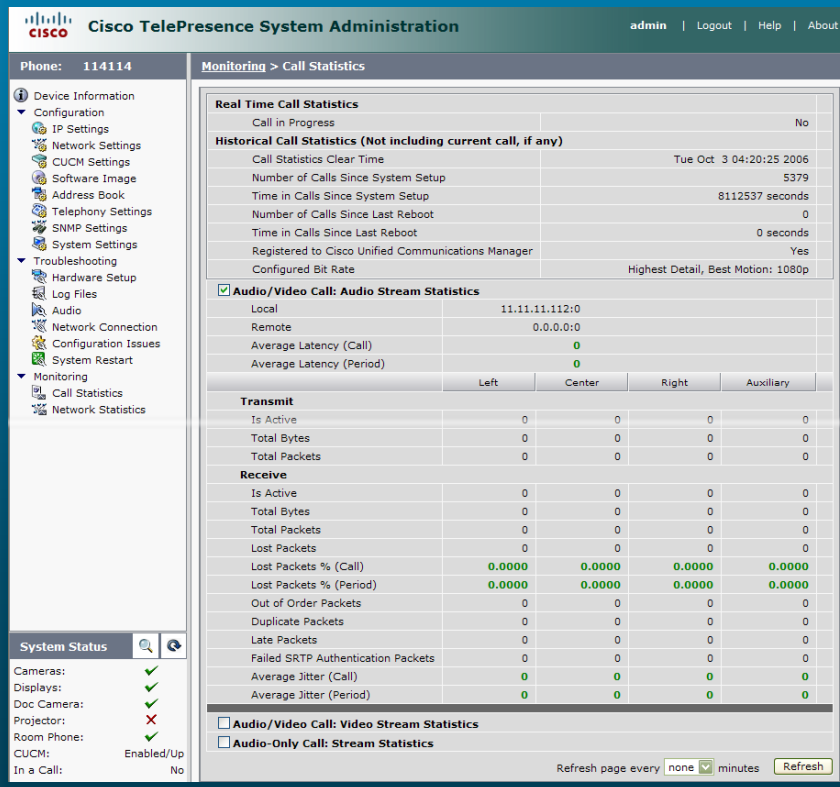
Embedded Linux on Compact Flash

Built on open standards

Leverages CUCM architecture

- CDP and 802.1Q for VLAN assignment
- 802.1p and DSCP for QoS
- HTTP Configuration/Firmware Downloads
- Secured Administration with SSH/HTTPs
- SIP signaling
- RTP and sRTP for Media
- UDP, TCP and TLS for Signaling
- Video: H.264 @ 1080p & 720p or CIF
- Audio: AAC-LD, G.711 & G.722




Cisco TelePresence System Administration
admin | Logout | Help | About
Phone: 114114
Monitoring > Call Statistics
Device Information
Configuration
IP Settings
Network Settings
CUCM Settings
Software Image
Address Book
Telephony Settings
SNMP Settings
System Settings
Troubleshooting
Hardware Setup
Log Files
Audio
Network Connection
Configuration Issues
System Restart
Monitoring
Call Statistics
Network Statistics
System Status
Cameras:
Displays:
Doc Camera:
Projector:
Room Phone:
CUCM: Enabled/Up
In a Call: No
Real Time Call Statistics
Call in Progress: No
Historical Call Statistics (Not including current call, if any)
Call Statistics Clear Time: Tue Oct 3 04:20:25 2006
Number of Calls Since System Setup: 5379
Time in Calls Since System Setup: 8112537 seconds
Number of Calls Since Last Reboot: 0
Time in Calls Since Last Reboot: 0 seconds
Registered to Cisco Unified Communications Manager: Yes
Configured Bit Rate: Highest Detail, Best Motion: 1080p
Audio/Video Call: Audio Stream Statistics
Local 11.11.11.112:0
Remote 0.0.0.0:0
Average Latency (Call) 0
Average Latency (Period) 0
Left Center Right Auxiliary
Transmit
Is Active 0 0 0 0
Total Bytes 0 0 0 0
Total Packets 0 0 0 0
Receive
Is Active 0 0 0 0
Total Bytes 0 0 0 0
Total Packets 0 0 0 0
Lost Packets 0 0 0 0
Lost Packets % (Call) 0.0000 0.0000 0.0000 0.0000
Lost Packets % (Period) 0.0000 0.0000 0.0000 0.0000
Out of Order Packets 0 0 0 0
Duplicate Packets 0 0 0 0
Late Packets 0 0 0 0
Failed SRTP Authentication Packets 0 0 0 0
Average Jitter (Call) 0 0 0 0
Average Jitter (Period) 0 0 0 0
Audio/Video Call: Video Stream Statistics
Audio-Only Call: Stream Statistics
Refresh page every none minutes
Refresh

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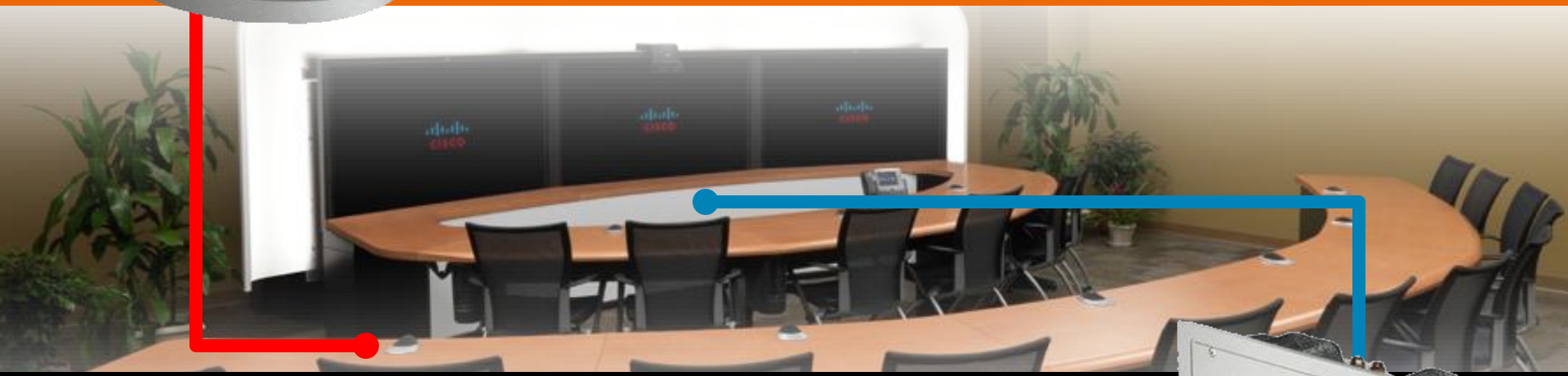
CTS Audio System

CTS 3000/CTS 3200 Triple Screen Endpoints

Microphones:

Spatial Audio with Echo Cancellation
One Dedicated for Each Table Segment
(3 in CTS 3000; up to 9 in CTS 3200)
Patented Cell Phone Static Elimination



3 Speakers:

Designed for Human Speech Reproduction
Mounted under Each Plasma Display
- Providing Directional (Spatial) Sound
- the Sound Follows Where the Image Goes

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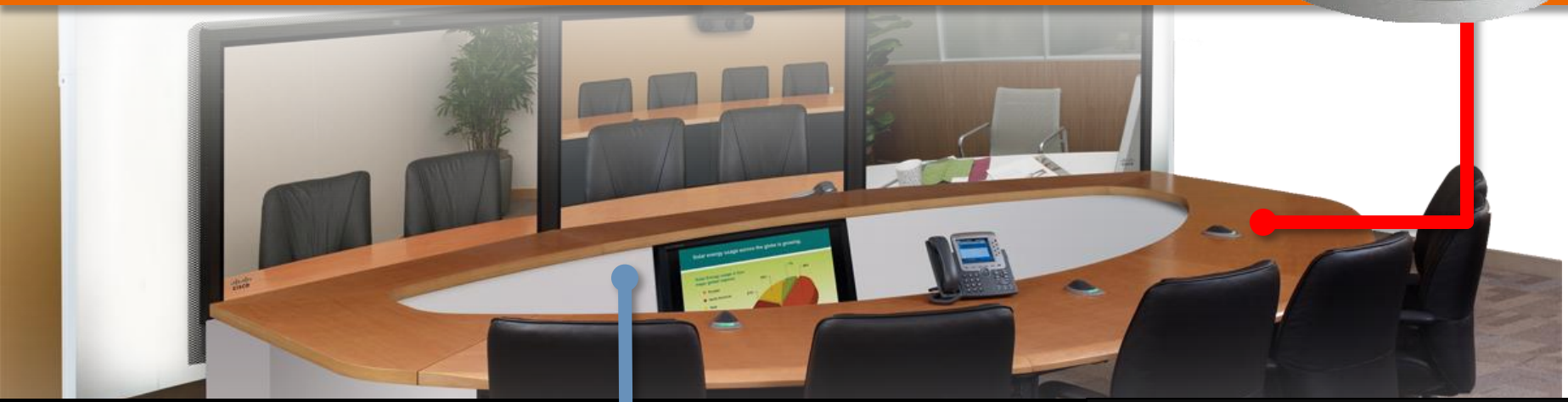
CTS Audio System

CTS 3010/CTS 3210

Microphones:

Spatial Audio with Echo Cancellation
One Dedicated for Each Table Segment
(3 in CTS 3010; up to 9 in CTS 3210)
Patented Cell Phone Static Elimination



3 Channels:

Center channel is split
onto 2 speakers for balance

Designed for Human Speech Reproduction
4 Speakers Mounted under Plasma Displays
- Providing Directional (Spatial) Sound
- the Sound Follows Where the Image Goes
- 2 Speakers for Center Segment,1 for Each of the Sides

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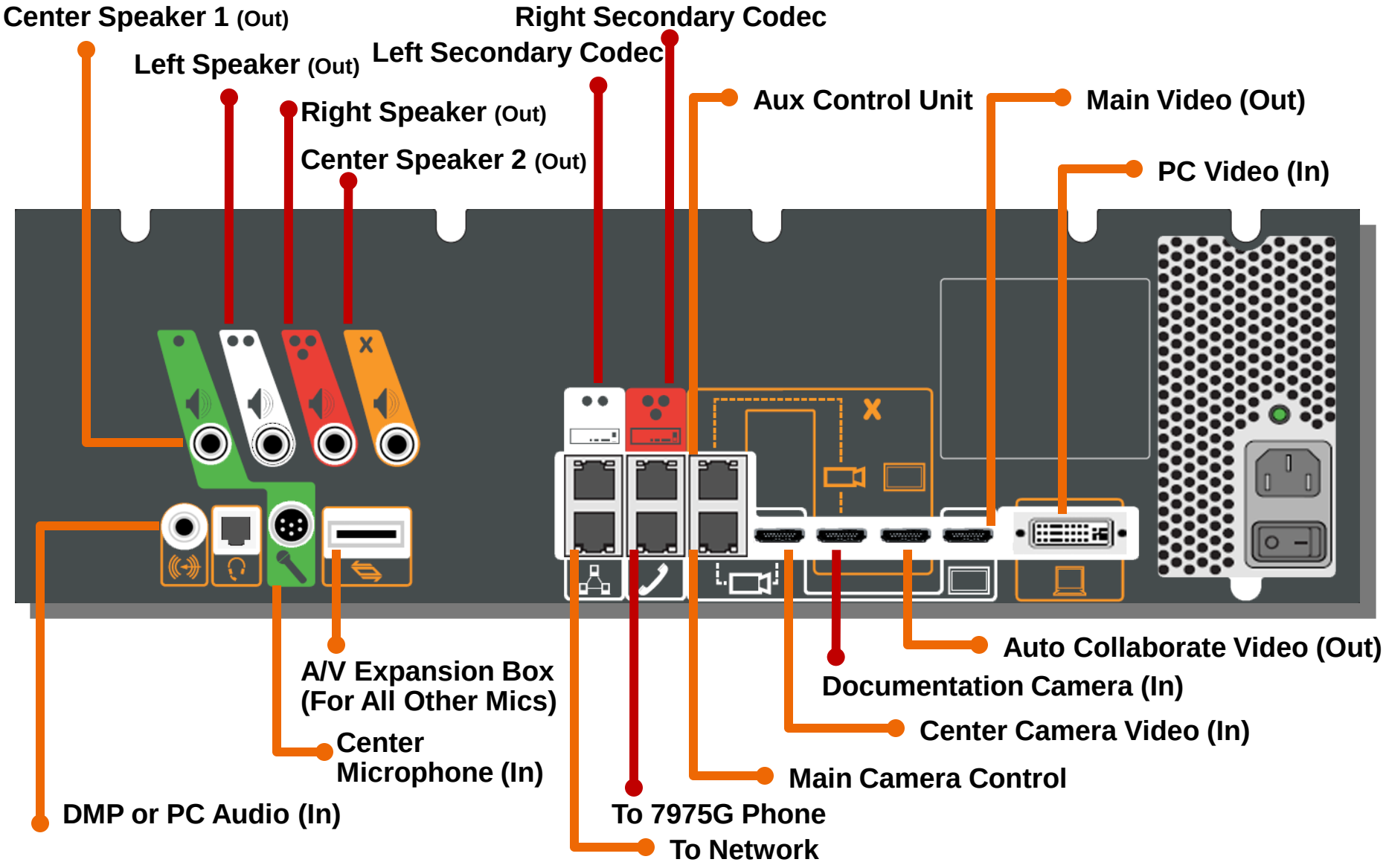
Cisco Immersive TelePresence

CTS 3210 Primary Codec Connector Illustration (G2)



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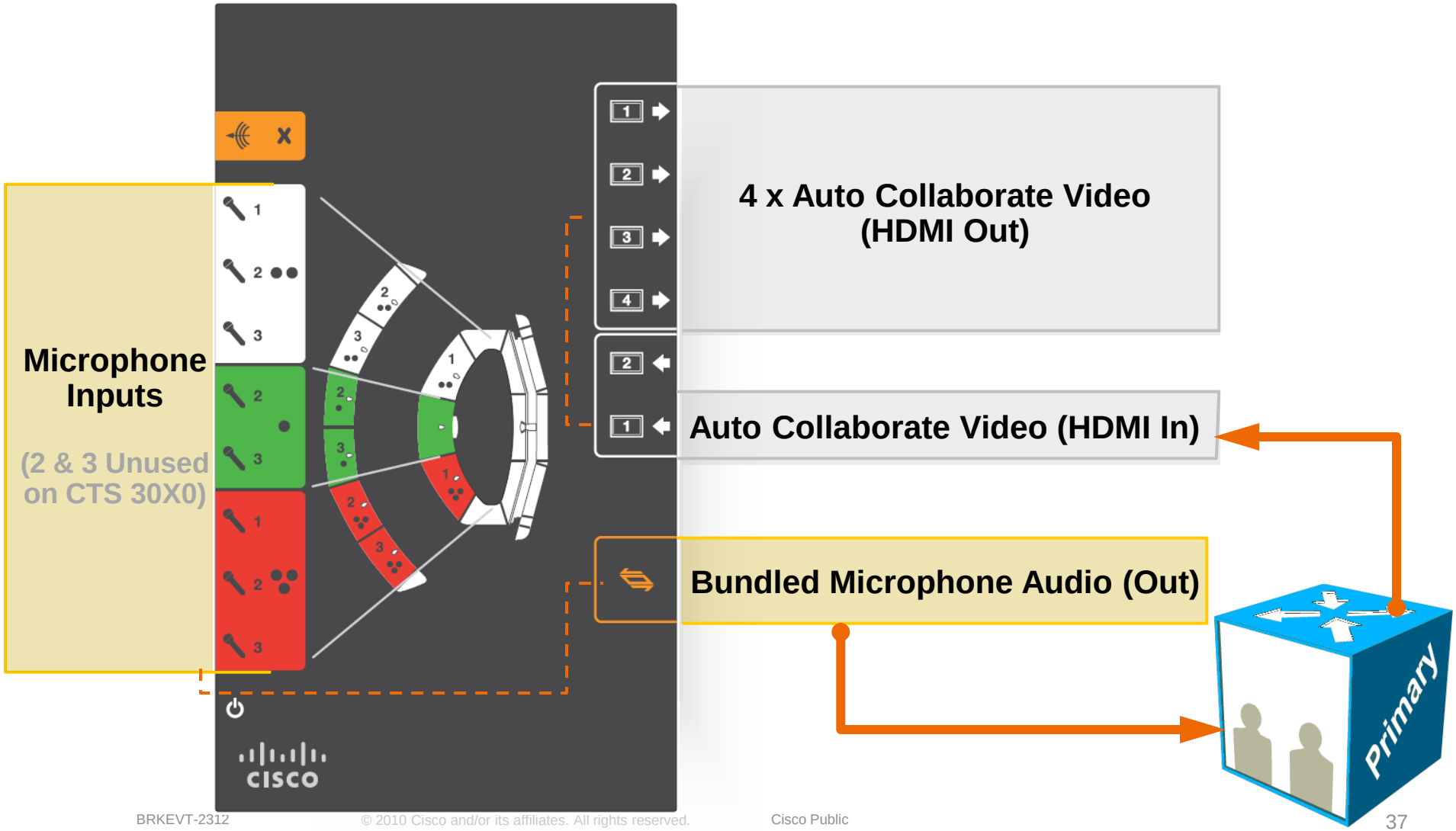
CTS-3XX0 Specific

A/V Expansion Box

Audio – 8:1 Microphone Input

Video – 1:4 Auto Collaborate Video Splitter



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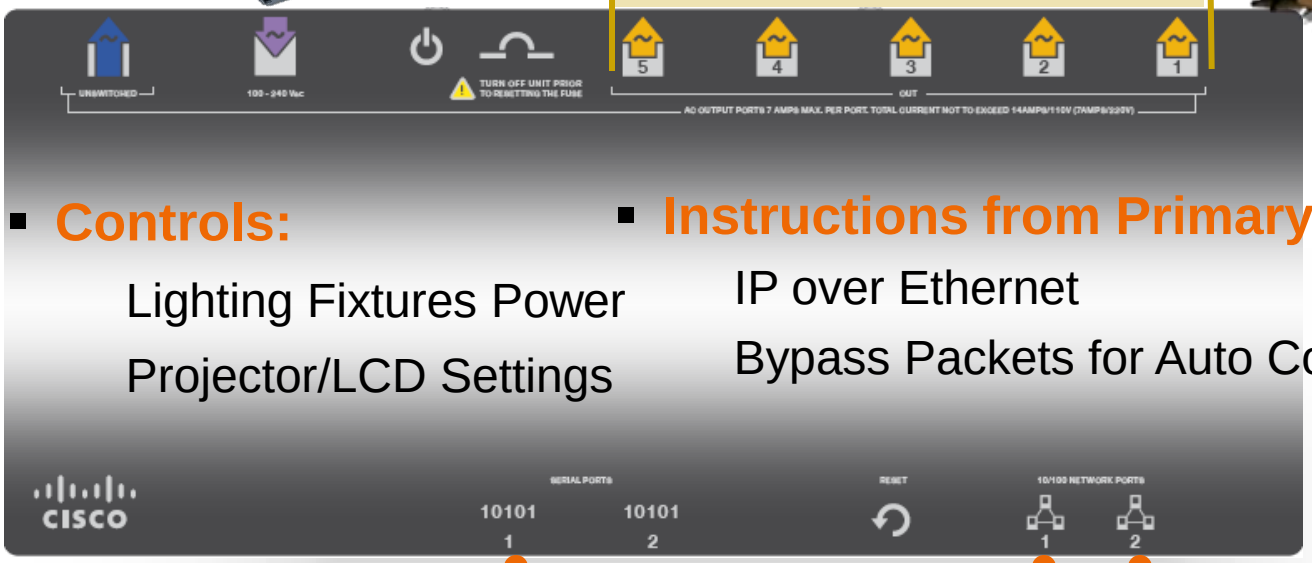
CTS-3XX0 Specific

Auxiliary Control Unit

Power from wall

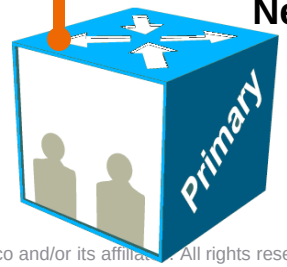
Power to 5 Lighting Fixtures



- **Controls:**
  - Lighting Fixtures Power
  - Projector/LCD Settings
- **Instructions from Primary Codec:**
  - IP over Ethernet
  - Bypass Packets for Auto Collaborate input devices

RS-232
Control to LCD or Projector

Doc Cam
Network Port



Auto Collaboration Input Devices

or

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Cisco Immersive TelePresence

User Interface

- **Cisco Unified IP Phone 7975G Provided as Part of CTS**
- **Provides Touch Screen User Interface to the CTS**

Communicate in XML

MIDlet Interface

- Features:
  - Manual Calling by Number
  - System Speed Dials
  - Future Scheduled Meetings Preview
  - “One Button to Push” dialing for Scheduled Meetings
  - Add Audio Participants to a TelePresence meeting
  - Simplified Operation and Faster Response Time with MIDlets (with CUCM 7+)

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Cisco Immersive TelePresence

On Screen Icons

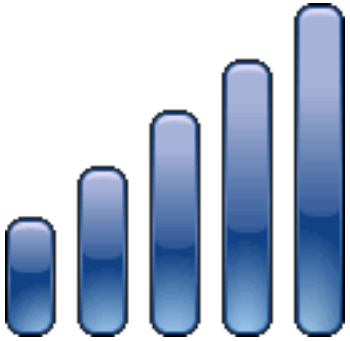
10 min left

2 min left

Muted

Secure Call

Non-Secure Call



5 bars

Hold

Presentation not Shared

Presentation Shared

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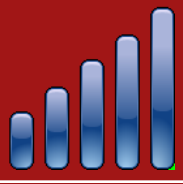
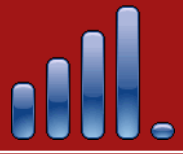
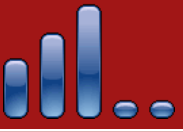
Cisco Immersive TelePresence

Network Quality Bars (since release 1.6)

Indication	Quality Metrics
	•All received streams is 1080p with no loss above the 1% warning threshold, and •The received presentation has no loss above 2% if active
	•The Lowest resolution of all received HD streams is 720p with loss ≤ 1%, and •The received presentation has no loss above 2% if active
	•The Lowest resolution of all received HD streams is CIF with loss ≤ 1, and •The received presentation has loss ≤ 2% if active
	•The highest percentage packet loss of all received HD streams > 1% but < 10%, or •The received presentation has loss between 2% and 10% if active
	•The highest percentage packet loss of all received HD streams is > 10%, or •The received presentation has loss above 10% if active

Network Bars replace on screen warning messages

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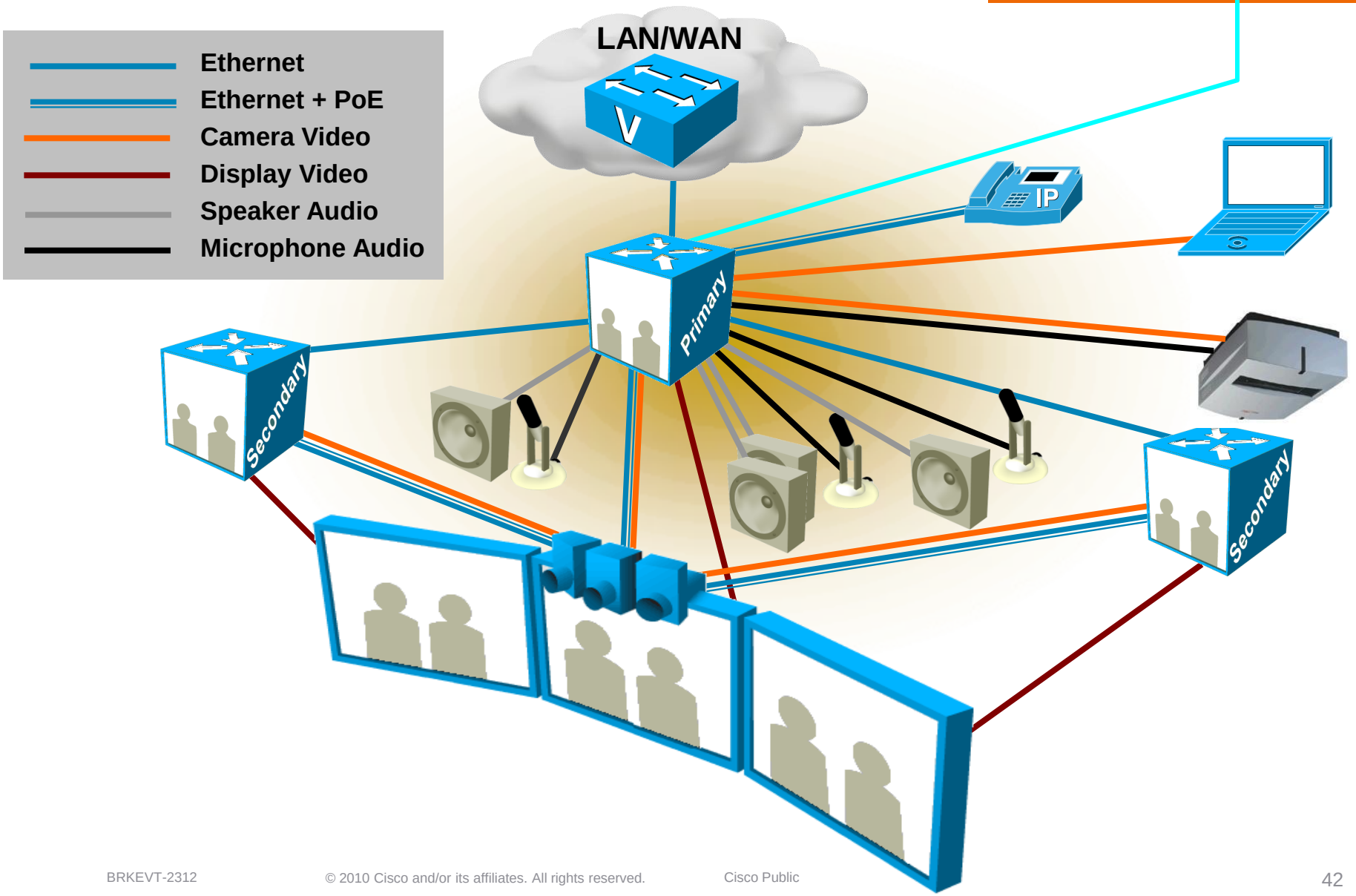
Cisco Immersive TelePresence

CTS-3010 Connectivity Illustration

Connections to the A/V Expansion Box Not Shown



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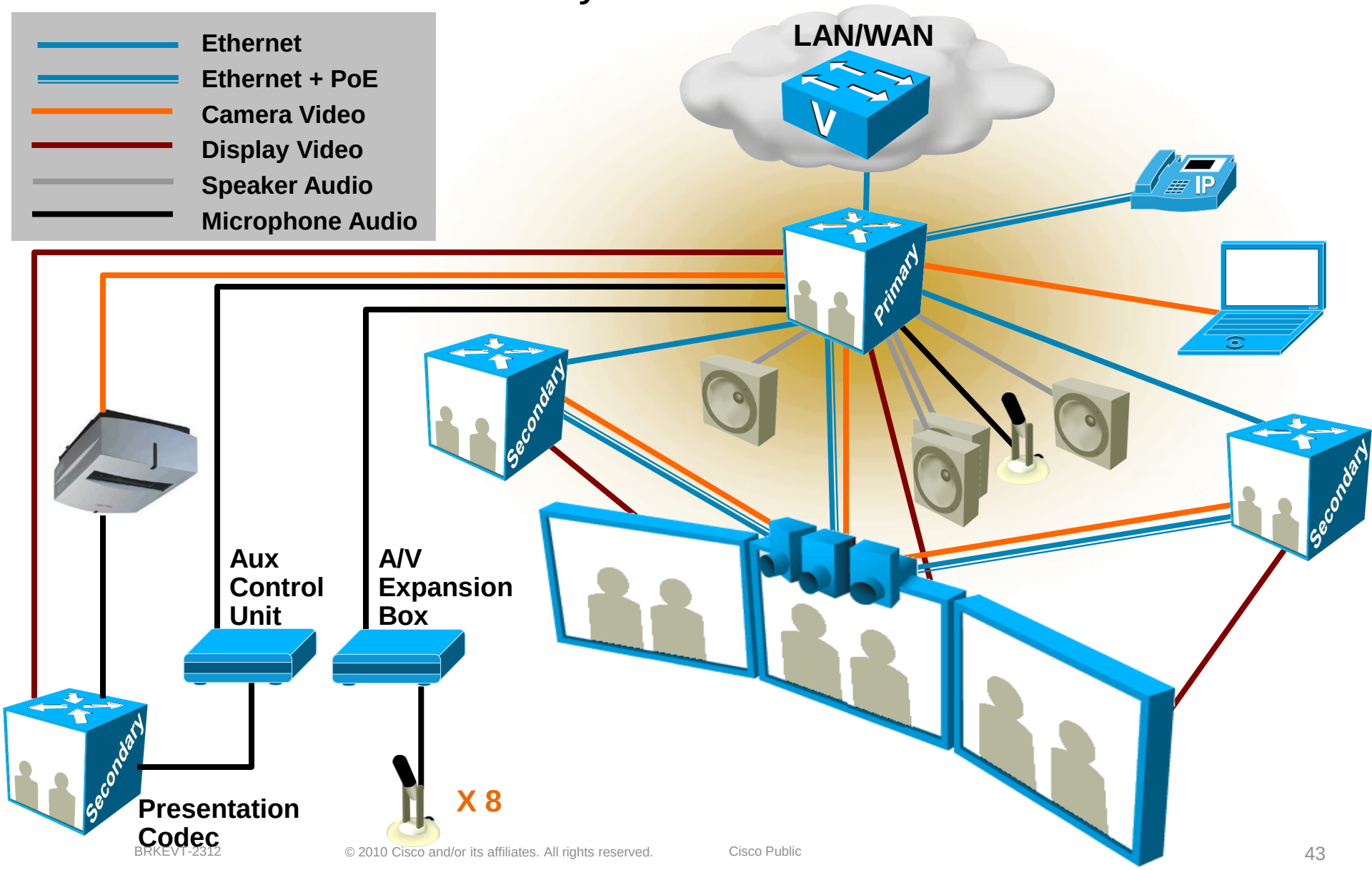
Cisco Immersive TelePresence

CTS-3210 Connectivity Illustration



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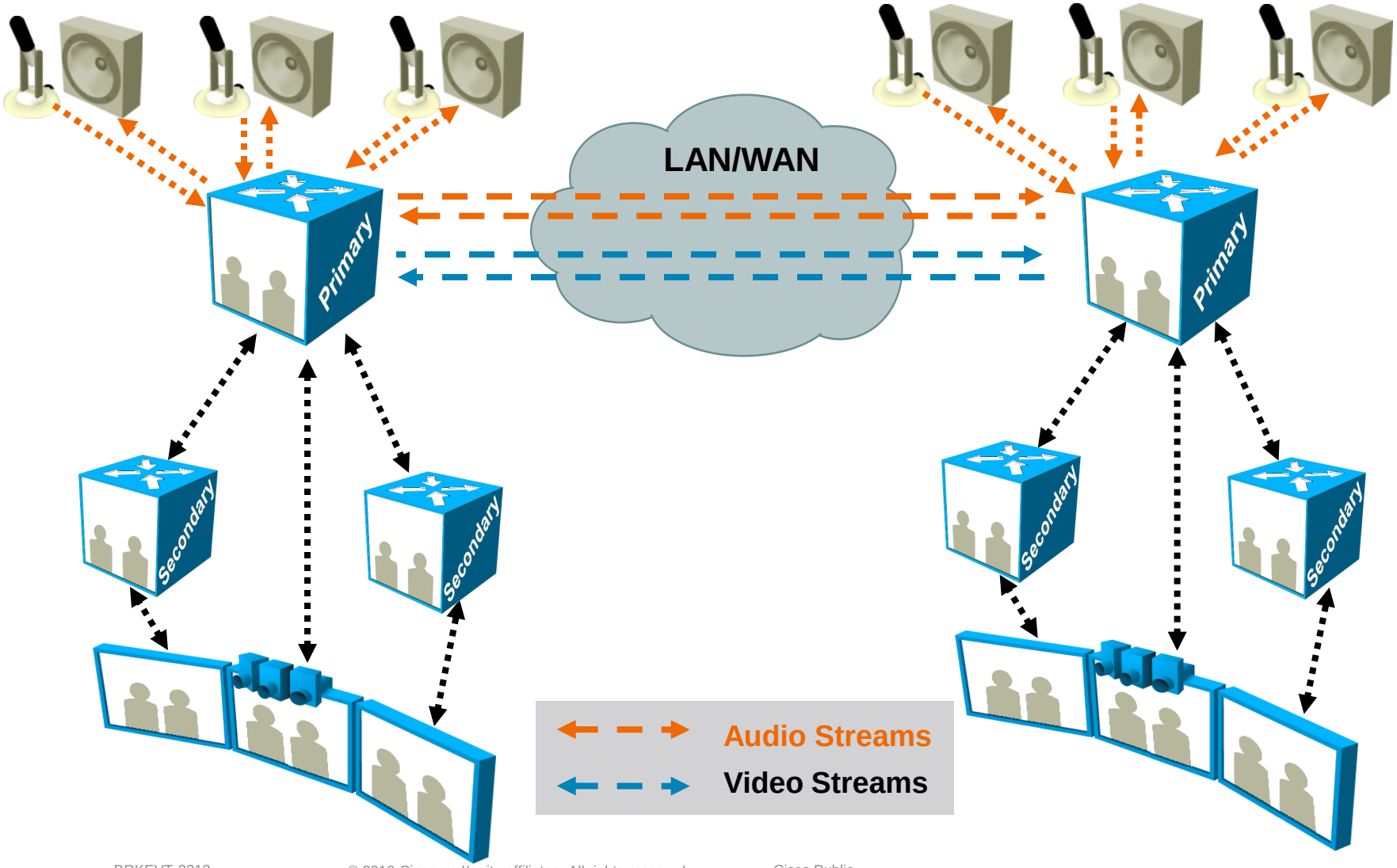
Cisco Immersive TelePresence

Audio and Video Multiplexing



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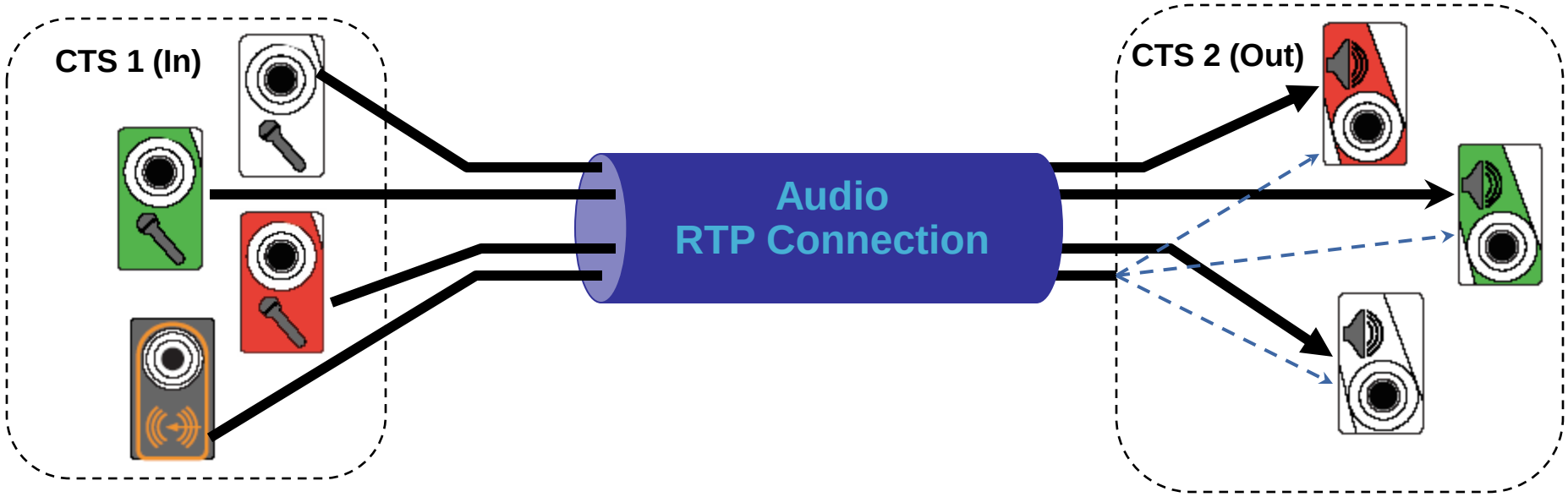
Cisco Immerisve TelePresence

Audio Flow – Between Triple Screen Systems



- Max 4 AAC-LD audio streams
  - Center, Left and Right channels = 3 streams
  - Line in and audio add-in = 1 stream
  - Different physical wiring on CTS-3200 but internal flow is identical*
- System audio sent to corresponding speaker
- Line in split and played out all speakers
- All audio streams share 1 common RTP connection

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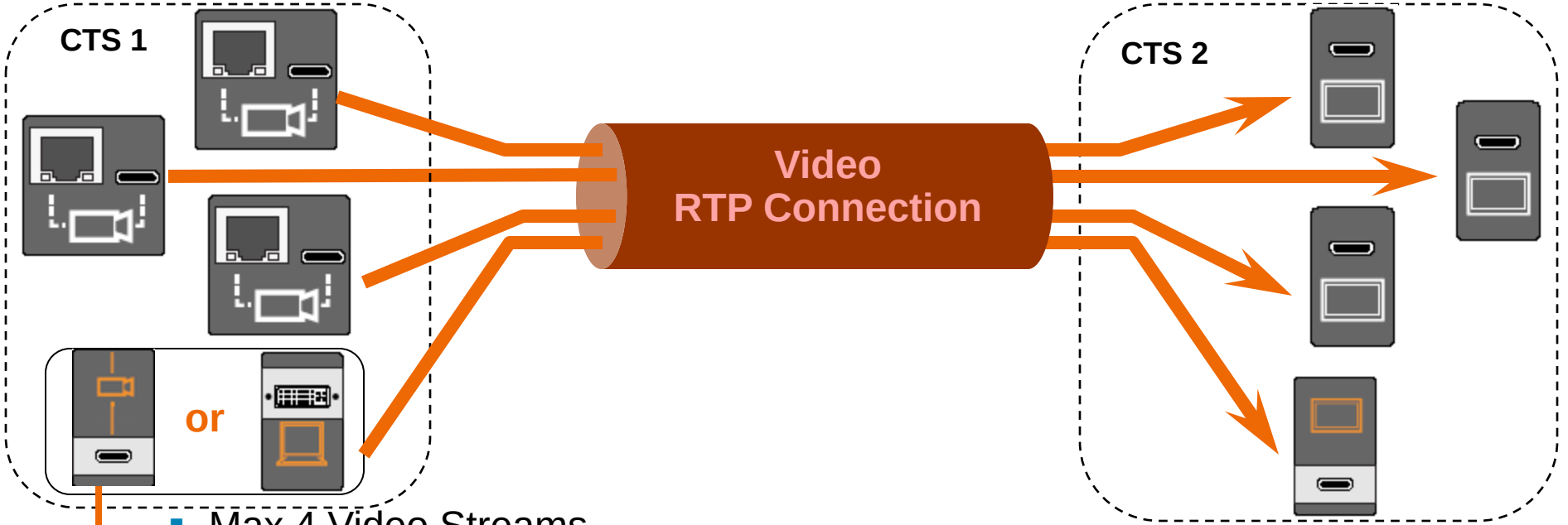
Cisco Immerisve TelePresence

Video Flow – Between Triple Screen Systems



- Max 4 Video Streams
  - Center, Left and Right Camera = 3 Video streams
  - Data Video = 1 Video stream
- All Video Streams share 1 common RTP Connection
- Each Camera stream is sent to the corresponding Display
- Data Video stream is sent to the Projector HDMI Outlet
  - Either doc cam **or** the PC input would be active at a time

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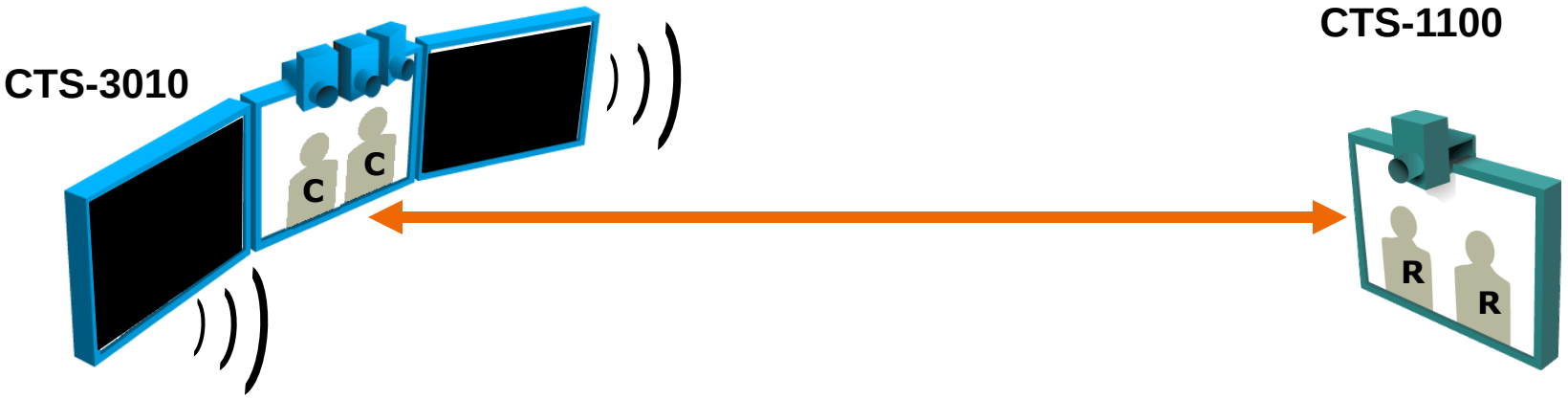
Cisco Immerisve TelePresence

Triple Screen System to Single Screen System

Example



- CTS-1100 appears on center display of CTS-3010
- CTS-3010 transmits active segment to CTS-1100
- Video is switched based on active speaker/segment
- CTS-1100 hears all segments of CTS-3010 (CTS-3010 transmits all four audio channels to CTS-1100)

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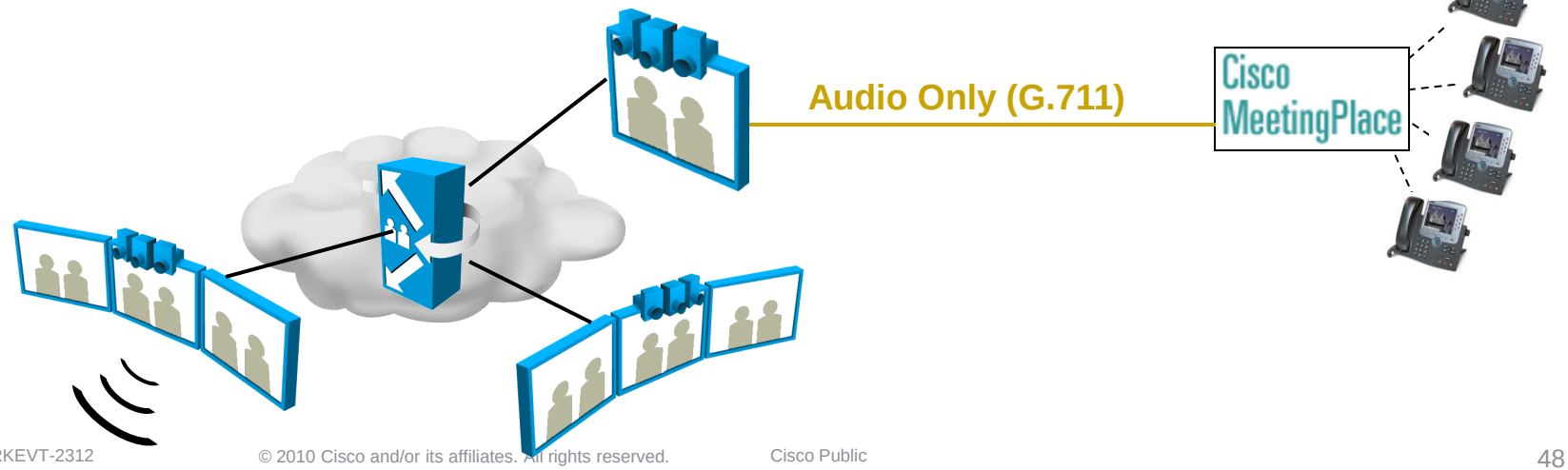
Cisco Immersive TelePresence
Audio Add-in

- Anytime during a TelePresence Meeting
- Adding An Audio Only Participant from
  - An Audio Only Phone with G.711, or
  - An Audio Bridge with G.711
- Initiated from the 7975G Touch Screen
- Dedicated AUX Audio Channel
  - Remix G.711 Audio into AAC-LD
  - Redistribute into TelePresence Meeting as AUX Audio



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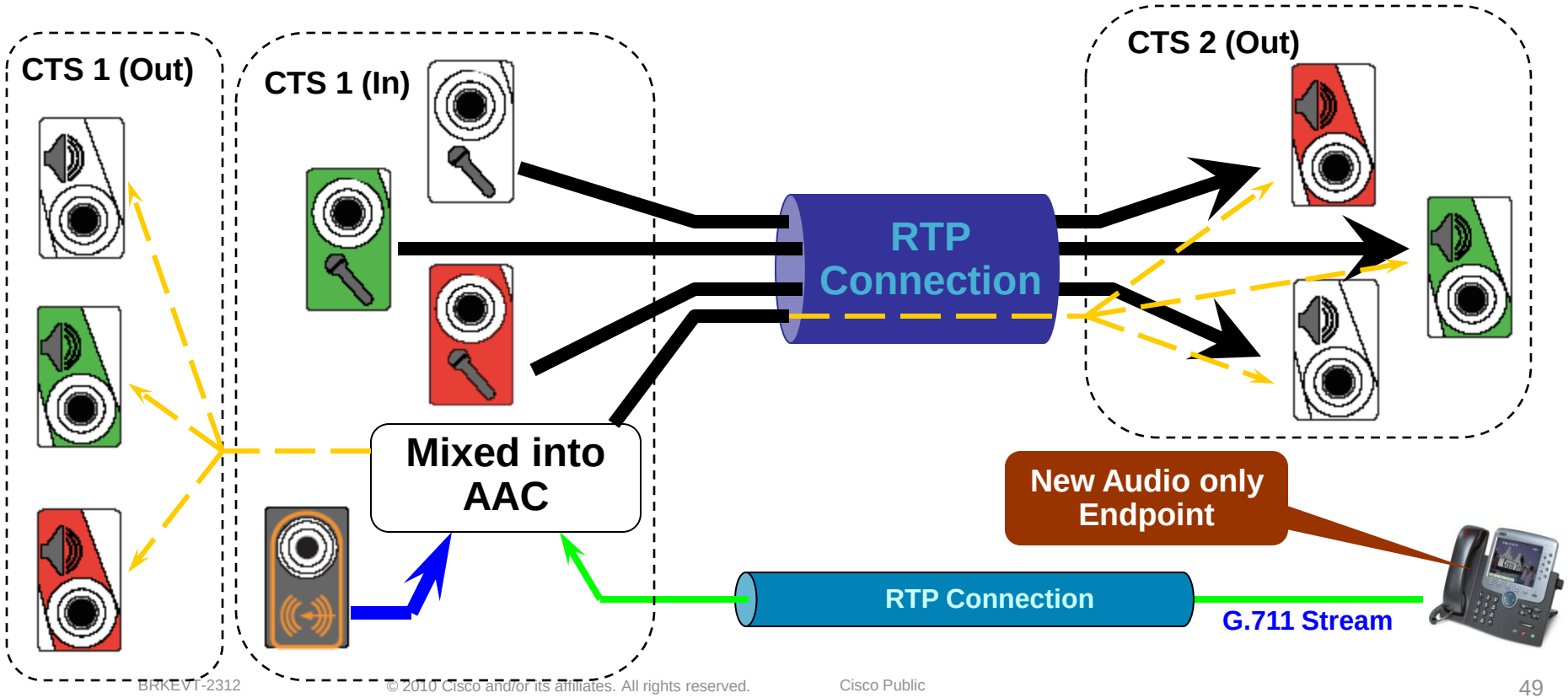
Cisco Immerisve TelePresence

Audio Flow – Audio Add-in Illustration

- Audio Add-in is an Audio Only call conferenced into a TelePresence Meeting
- A Separate Call Leg from the Audio Only Device to the CTS
- The CTS mixes the Audio Only stream into the AUX stream
- Mixed AUX Stream is Played out Evenly to ALL Local/Remote Speakers
- Same for Single Screen Systems without the Side Speakers



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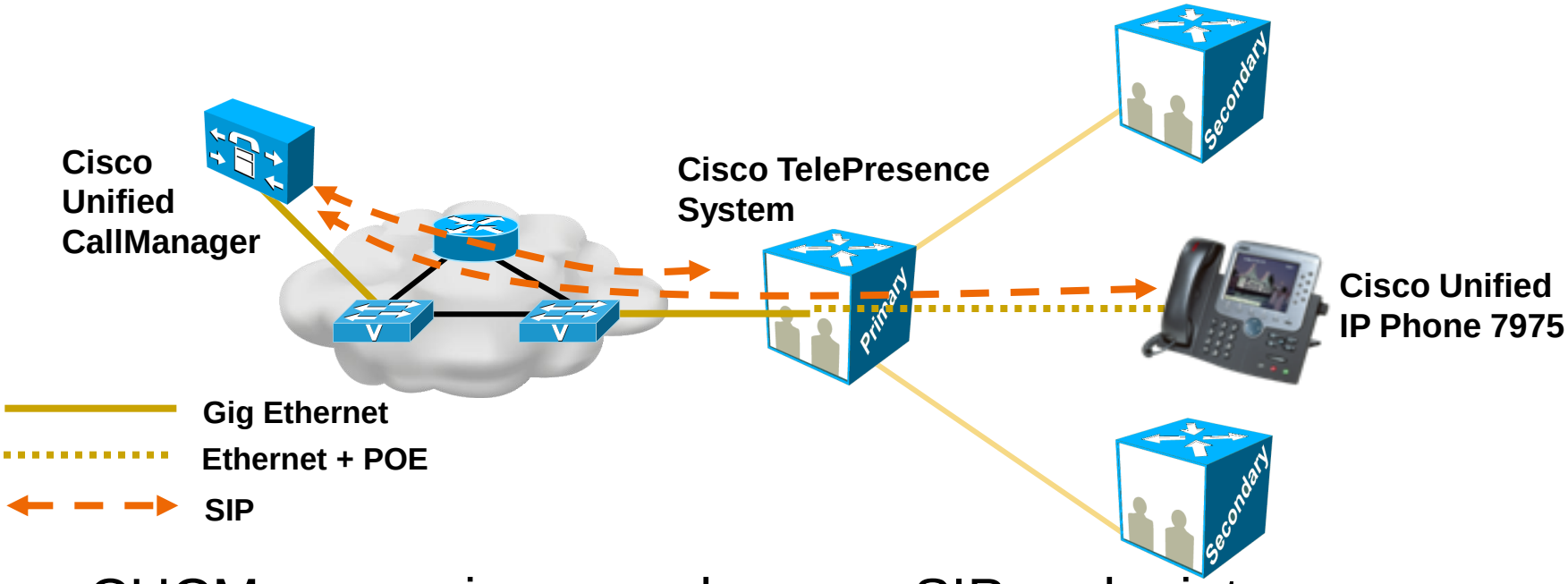
Cisco Immersive TelePresence

CUCM—CTS Communication



- CUCM sees primary codec as a SIP endpoint
- Secondary codecs are invisible to the network and to CUCM
- Cisco Unified IP Phone 7975 runs SIP (not SCCP)
- Primary codec and IP Phone share a line appearance

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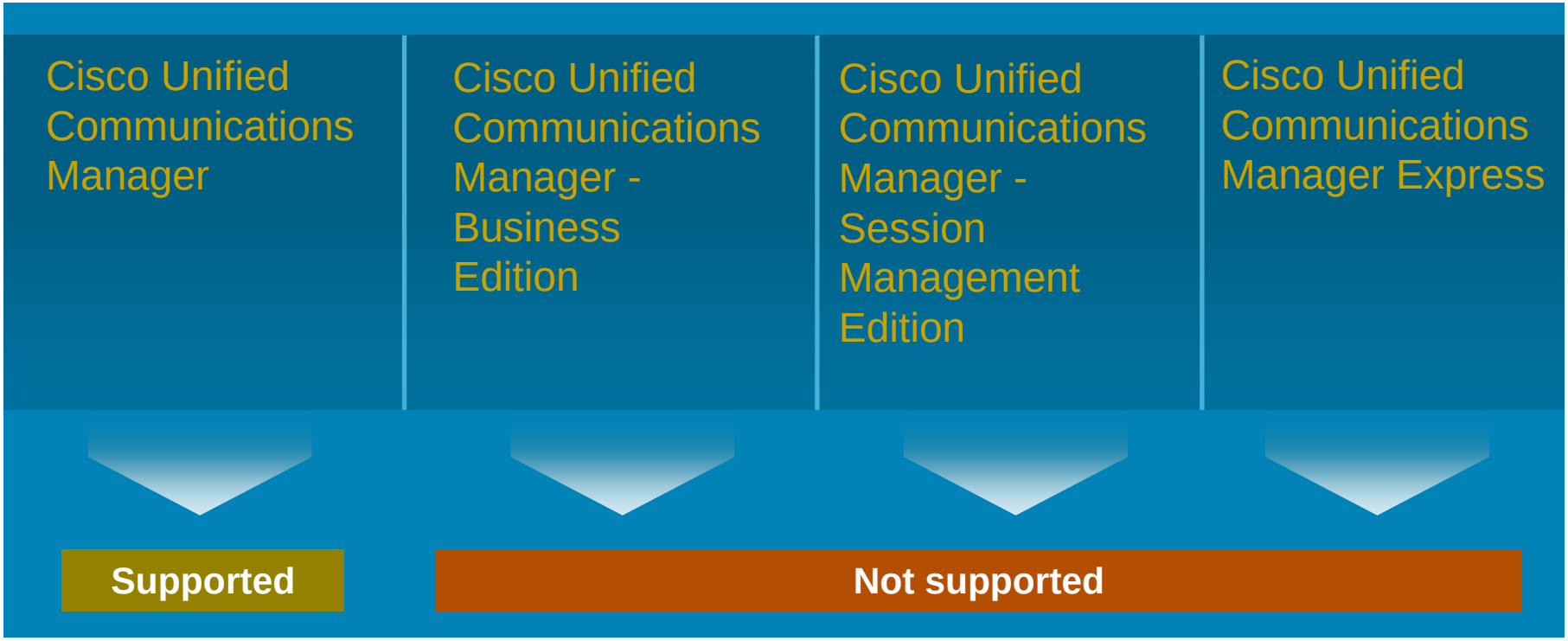
Cisco Immersive TelePresence in the Enterprise

CUCM „type”


Cisco Unified Communications Manager
Cisco Unified Communications Manager - Business Edition
Cisco Unified Communications Manager - Session Management Edition
Cisco Unified Communications Manager Express
Supported
Not supported

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Cisco Immersive TelePresence in the Enterprise

For Your Reference

CUCM version

TelePresence System	Unified CM
Release 1.0(x) November 2006	Release 5.0(4) or greater
Release 1.1(x) April 2007	Release 5.1(2b) or greater
Release 1.2(x) November 2007	Release 6.0(1) or greater Release 6.1(2) or higher recommended
Release 1.3(x) April 2008	Release 6.0(1) or greater Release 6.1(2) or higher recommended
Release 1.4(x) August 2008	Release 6.0(1) or greater Release 6.1(3) or higher recommended
Release 1.5(x) December 2008	Release 7.0(1) or greater
Release 1.6(x) November 2009	Release 7.0 (2a) SU2 or greater
Release 1.7(X) June 2010	Release 7.1 (3b)SU2 or greater

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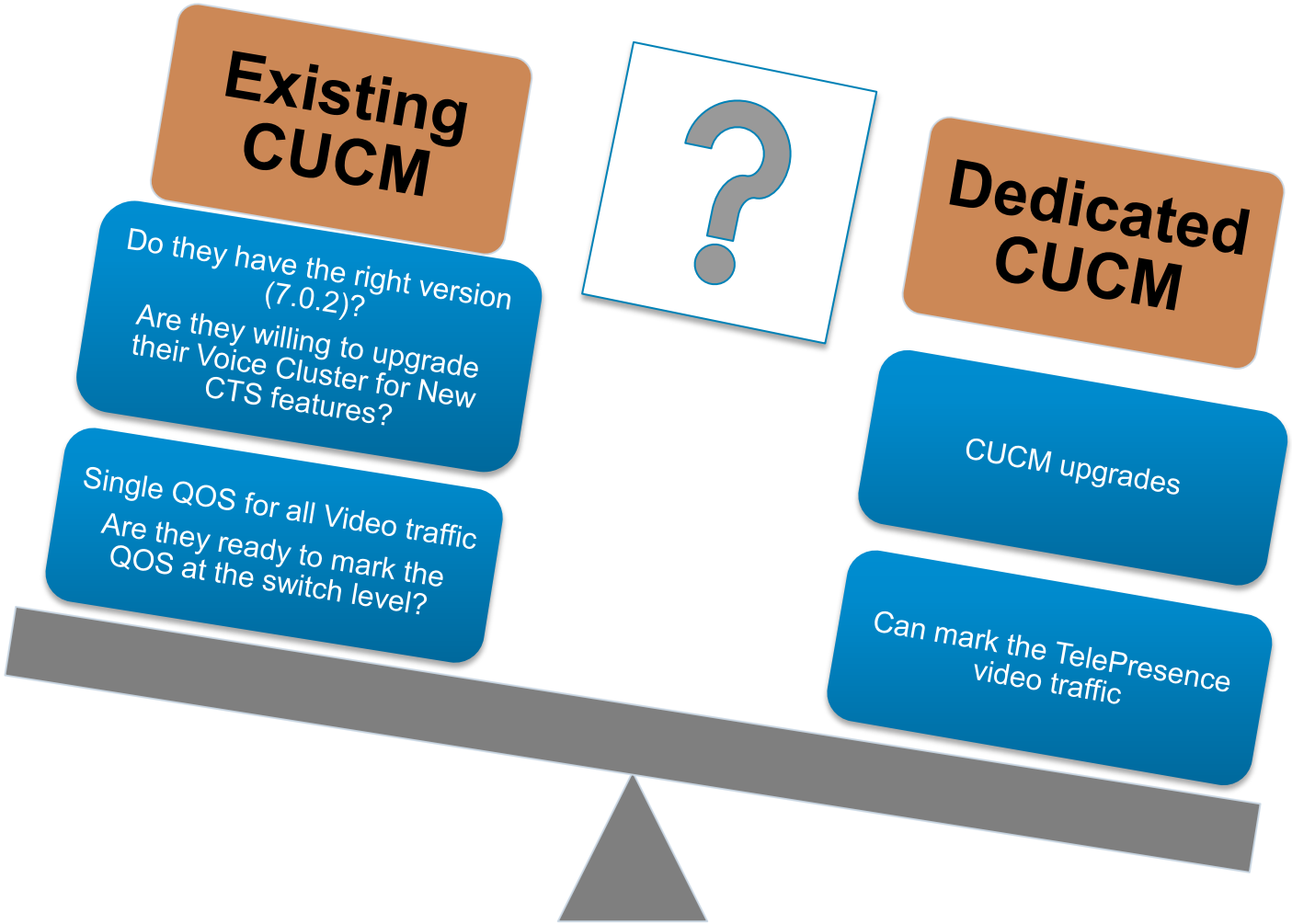
Cisco Immersive TelePresence in the Enterprise

CUCM deployment consideration


Existing CUCM
Do they have the right version (7.0.2)?
Are they willing to upgrade their Voice Cluster for New CTS features?
Single QOS for all Video traffic
Are they ready to mark the QOS at the switch level?
?
Dedicated CUCM
CUCM upgrades
Can mark the TelePresence video traffic

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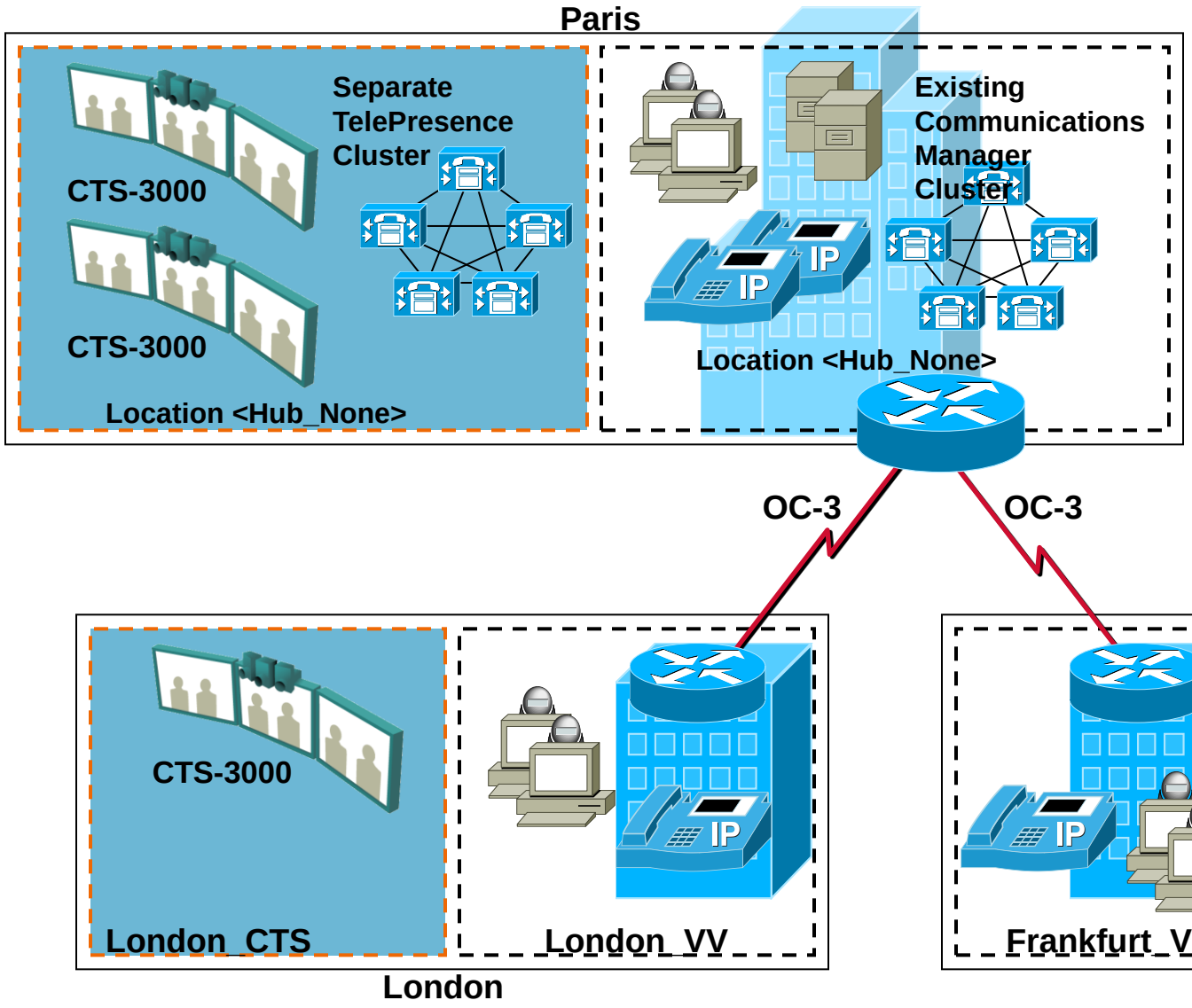
Cisco TelePresence - CUCM Integration

Separate CUCM Clusters



- Communications Manager cluster to support IP Telephony and Video Telephony
- Locations based CAC for IP Telephony and Video Telephony
- Separate Communications Manager cluster to support TelePresence
- Location based CAC used for TelePresence

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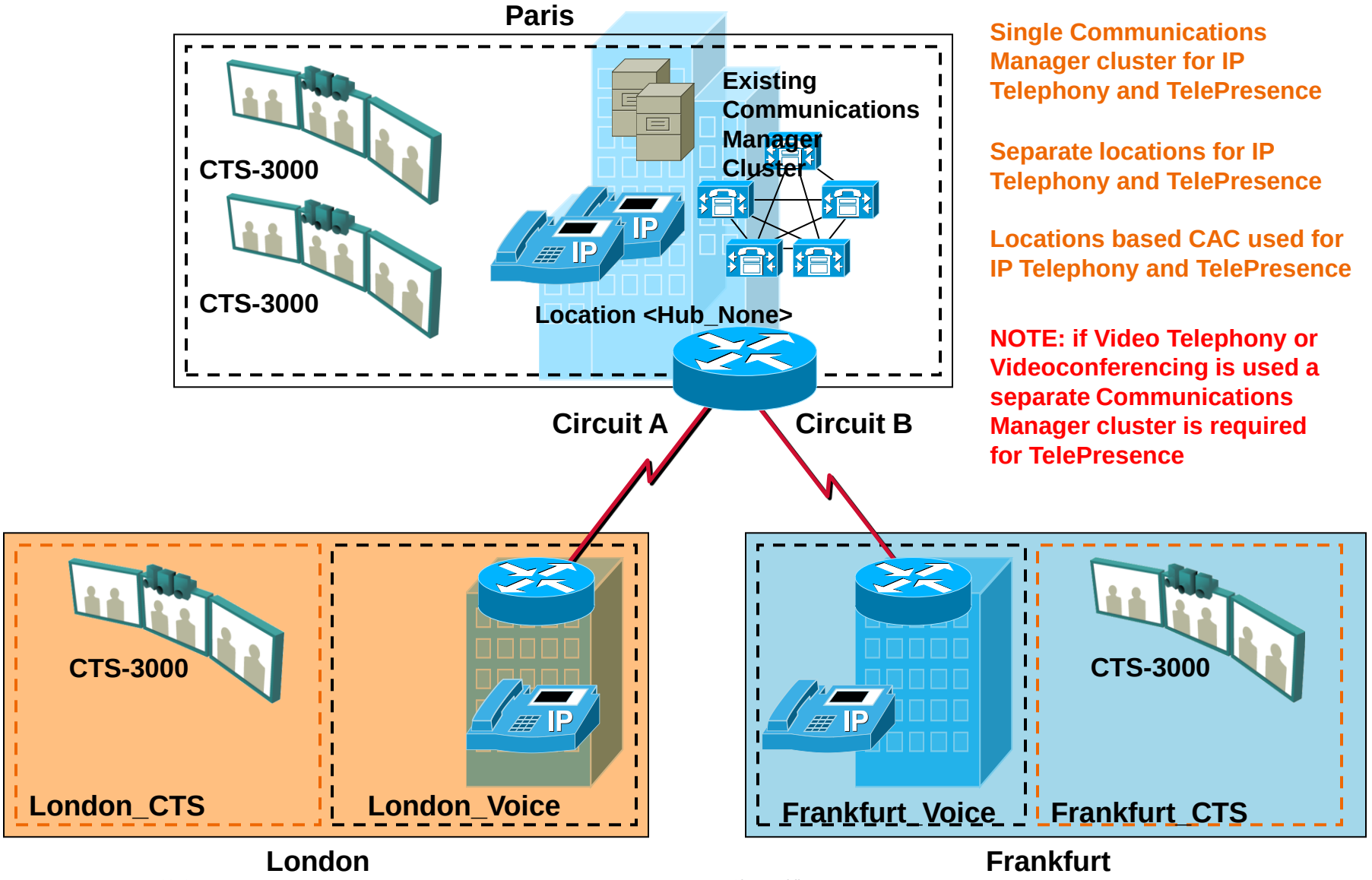
Cisco TelePresence - CUCM Integration

Single CUCM Cluster



Single Communications Manager cluster for IP Telephony and TelePresence

Separate locations for IP Telephony and TelePresence

Locations based CAC used for IP Telephony and TelePresence

NOTE: if Video Telephony or Videoconferencing is used a separate Communications Manager cluster is required for TelePresence

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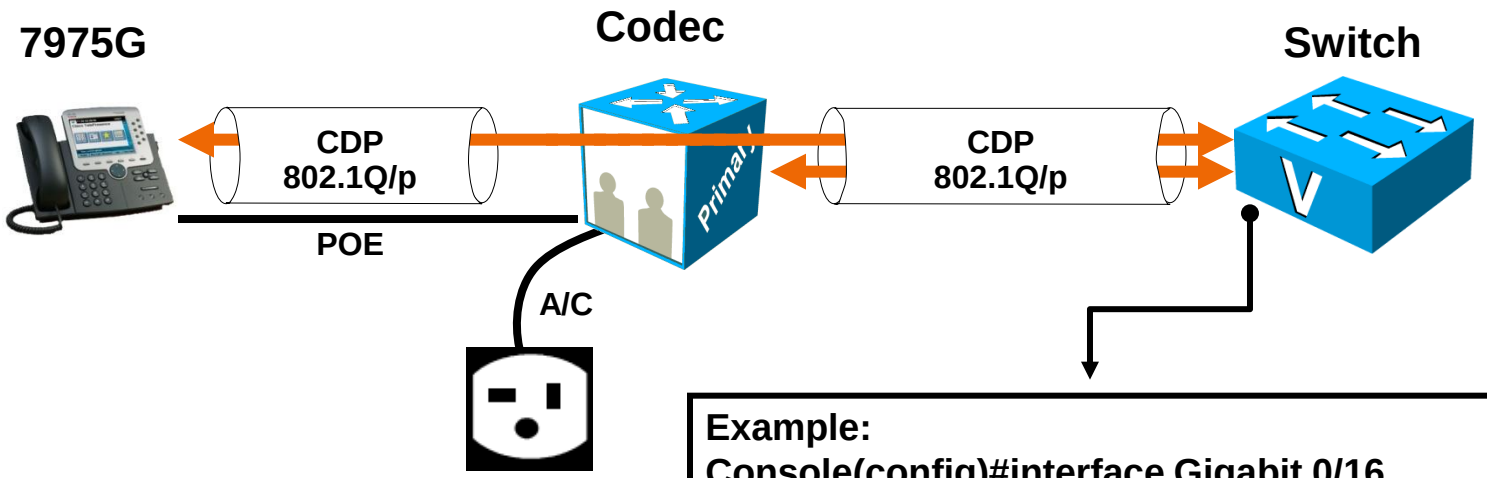
Cisco Immerisve TelePresence
Network Connectivity

- Phone and primary codec both reside on the Voice VLAN
- Primary codec passes CDP and 802.1Q/p between the phone and network.
- Switch sees two CDP neighbors.
- Switch QoS trust is extended through the codec to the phone



Example:
Console(config)#interface Gigabit 0/16
Console(config-if)#switchport mode access
Console(config-if)#switchport access vlan 261
Console(config-if)#switchport voice vlan 262
Console(config-if)#spanning-tree portfast
Console(config-if)#mls qos trust {dscp | cos}

- **Phone and cameras receive Power over Ethernet (802.3af) from codec(s)**

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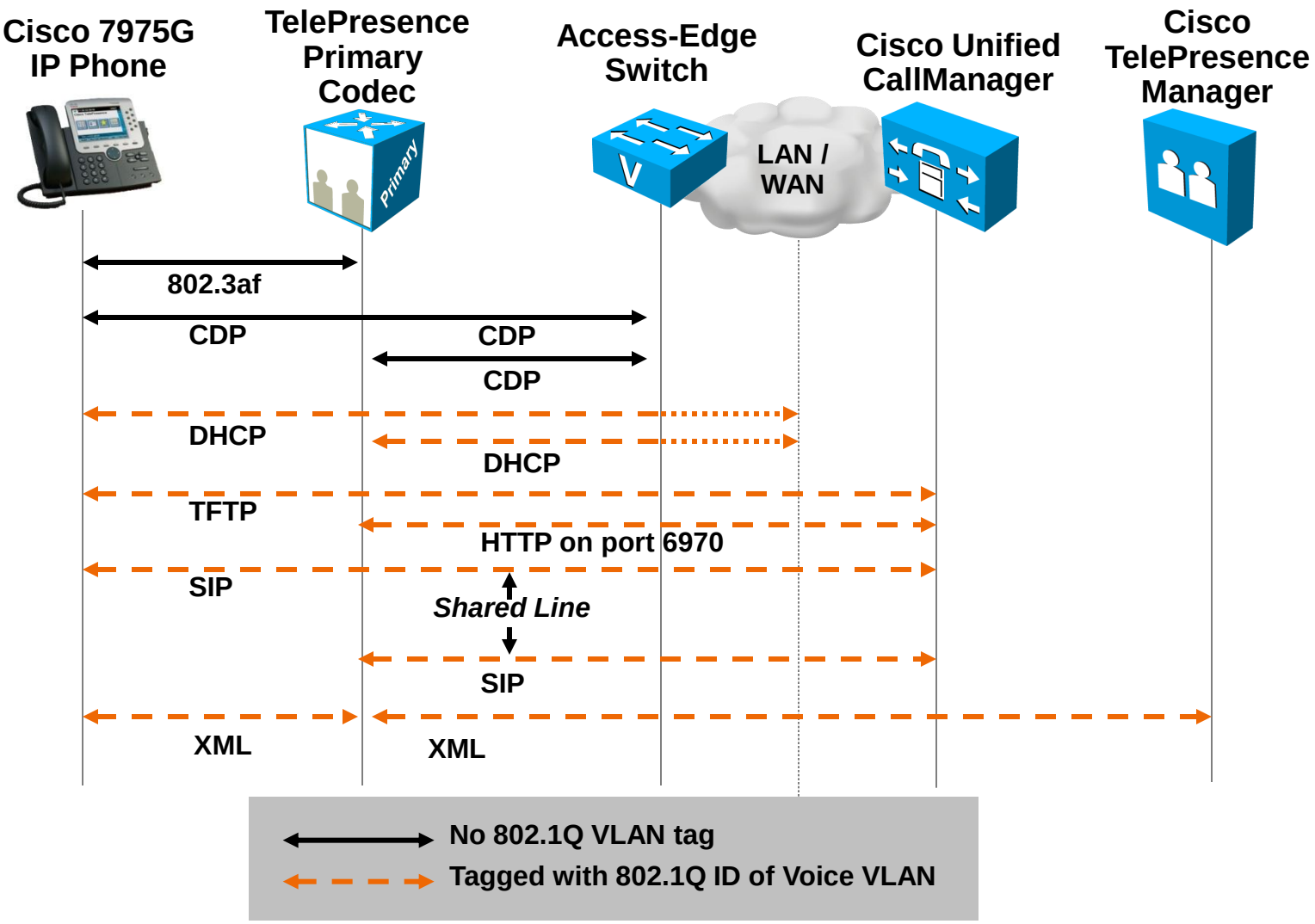
Cisco Immerisve TelePresence

CTS Network Protocol Interaction



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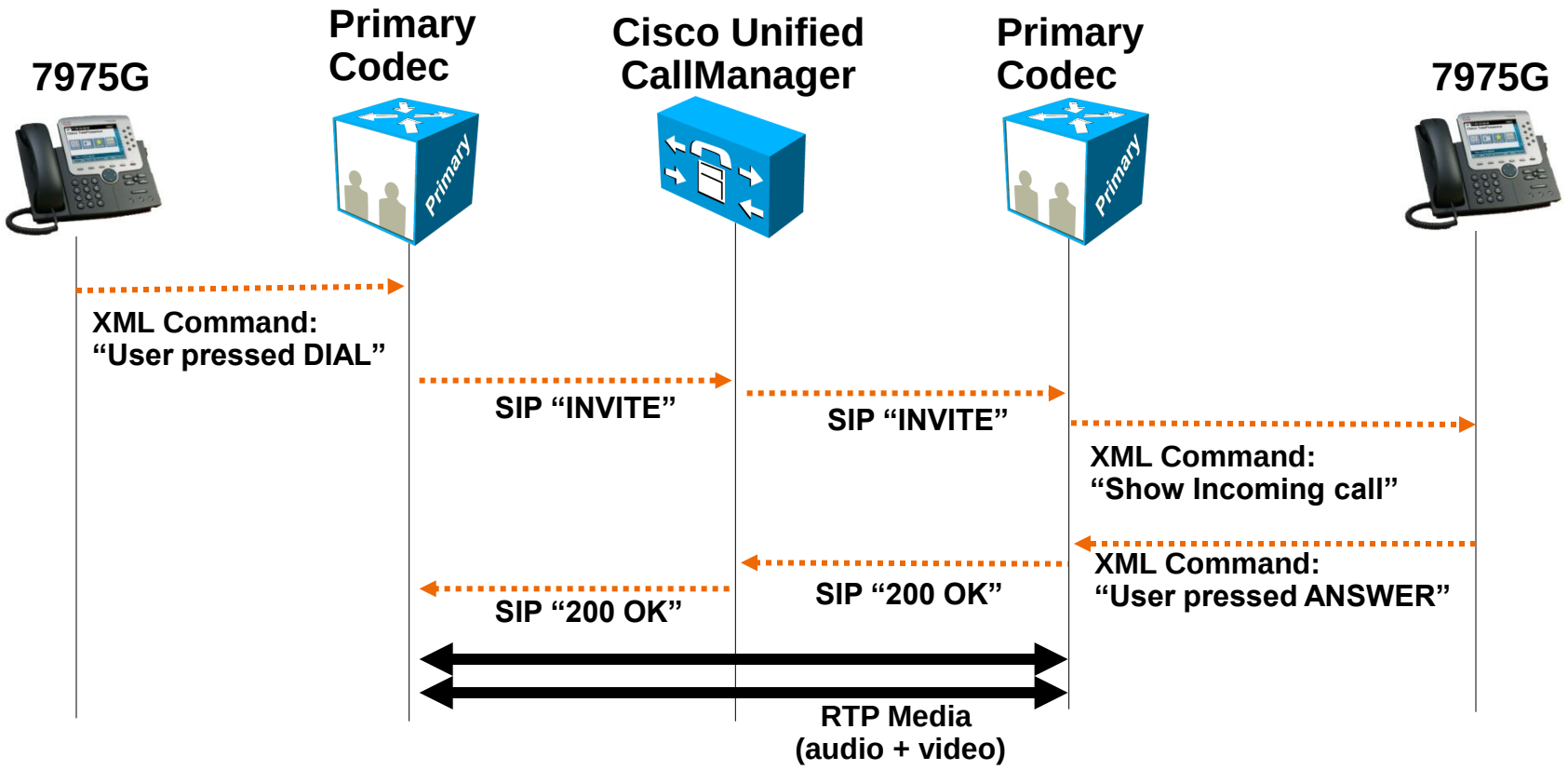
Cisco Immerisve TelePresence

CTS Call Setup Illustration



Signaling

Media

Note: Signaling has been simplified for the purpose of this slide. There are many other XML and SIP messages which are not shown.

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Cisco Immersive TelePresence

Resolution and Motion Handling determined by CUCM

Quality (per Display)*
Highest Detail, Best Motion: 1080p
Highest Detail, Best Motion: 1080p
Highest Detail, Better Motion: 1080p
Highest Detail, Good Motion: 1080p
High Detail, Best Motion: 720p
High Detail, Better Motion: 720p
High Detail, Good Motion: 720p
High Detail, Limited Motion: 720p (Lite)

Part of CUCM Administration for each CTS

- 1080p and 720p Resolutions
- 3 Motion Handling Modes for 1080p
- 4 Motion Handling Modes for 720p
- Flexibility for Sites with Bandwidth Constraints
- Dynamically Reduced Motion Handling
  - Due to excessive Frame Jitter or Packet Loss
  - No Resolution Change
  - (e.g. 1080p-Best → 1080p-Good)

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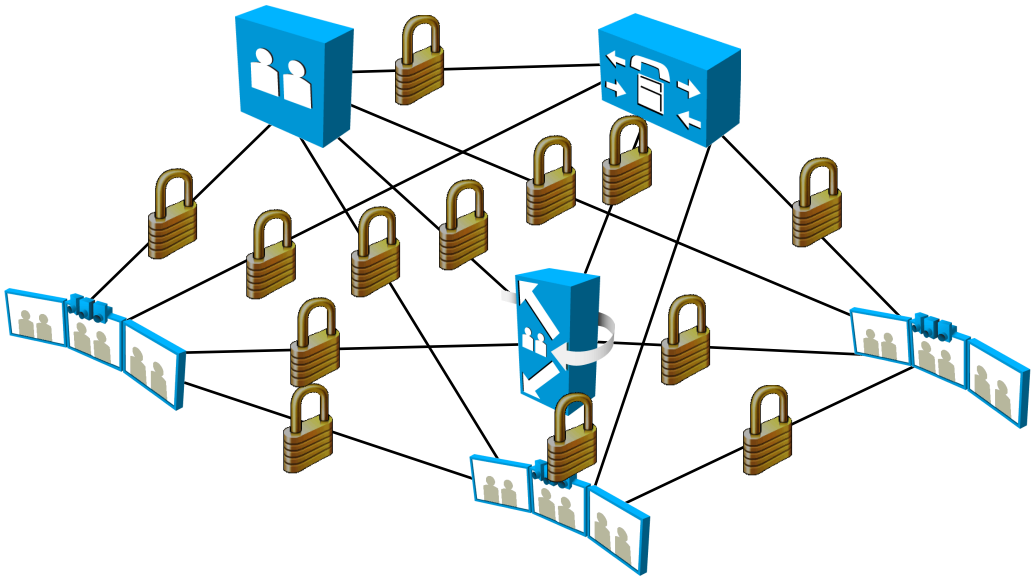
Cisco Immersive TelePresence
Security Architecture

- Authenticated and Encrypted Media
- Authenticated and Encrypted Signaling
- Authenticated and Encryption MultiPoint Calls support
- Authenticated and Encryption Infrastructure support



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Cisco Immersive TelePresence

Security Protocols Summary

- Based on Cisco Unified Communications
  - ✓ X.509v3 Digital Certificates (MIC / LSC)
  - ✓ Certificate Trust List (CTL)
  - ✓ Signed Firmware Loads
  - ✓ Signed / Encrypted Configuration Files
  - ✓ SIP over TLS
  - ✓ Secure Real-Time Transport Protocol (sRTP)
  - ✓ S-Description Key Exchange in Session Description Protocol (SDP)
- Additional Support Only by Cisco TelePresence
  - + DTLS Key Exchange (TLS over UDP)
  - + HTTPS Admin Web Interface
  - + HTTPS CTS-Man Meeting Updates

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Cisco Immersive TelePresence AGENDA

- Introduction to Immersive TelePresence
- Selecting and evaluating rooms
- System Components
- Scheduling
- Media Services for TelePresence
- Planning and preparing the network
  - Is the network ready?

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Cisco TelePresence in the Enterprise

CTS-Manager (CTS-MAN)

cisco
Cisco TelePresence Manager
Username
Password
Log In
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- End user features:
  - Scheduling
  - One Button to Push (OBTP)
- Administrator features:
  - Endpoint and Multipoint Resource Management
  - Dashboard view
  - Entitlement
- Deployment:
  - Easy Integration – no major changes in existing environment
  - No training required for end user scheduling and OBTP

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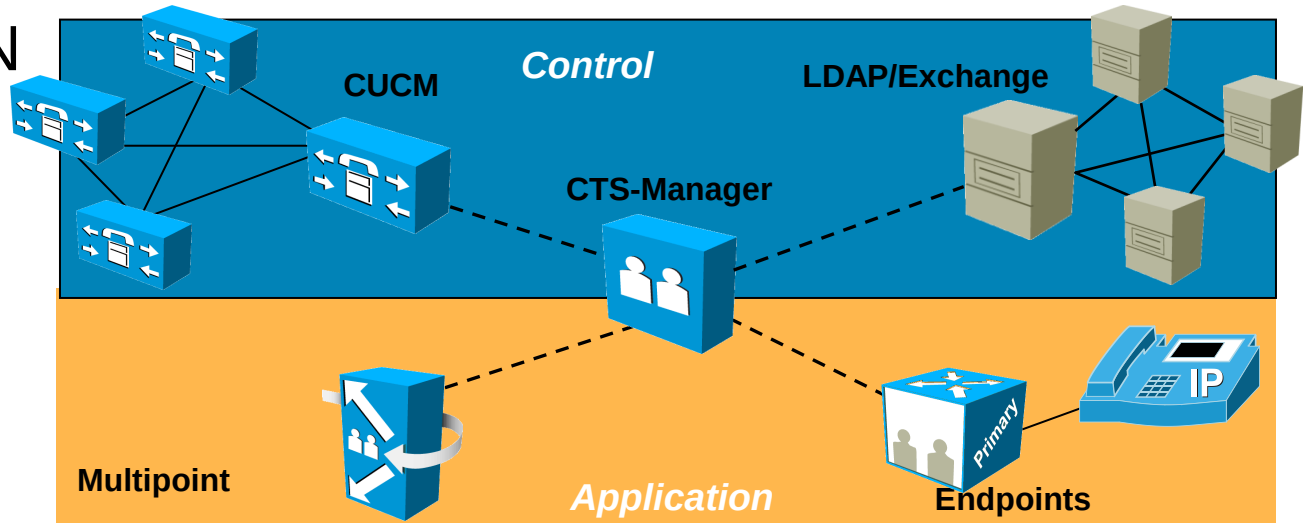
Cisco TelePresence in the Enterprise

CTS-MAN



- Manages CTS resources for all calls (p2p and mutlipoint)
  - Verifies availability, books rooms, provides „One button to push”
- Manages multipoint resources
  - Geographic selection based on time zone
- Without CTS-MAN...
  - No „One button to push” for CTS
  - No Scheduled Multipoint or resource management for CTMS
  - No concierge feature during an active call
  - No one place for administrators with dash board view of availability of rooms and active meetings

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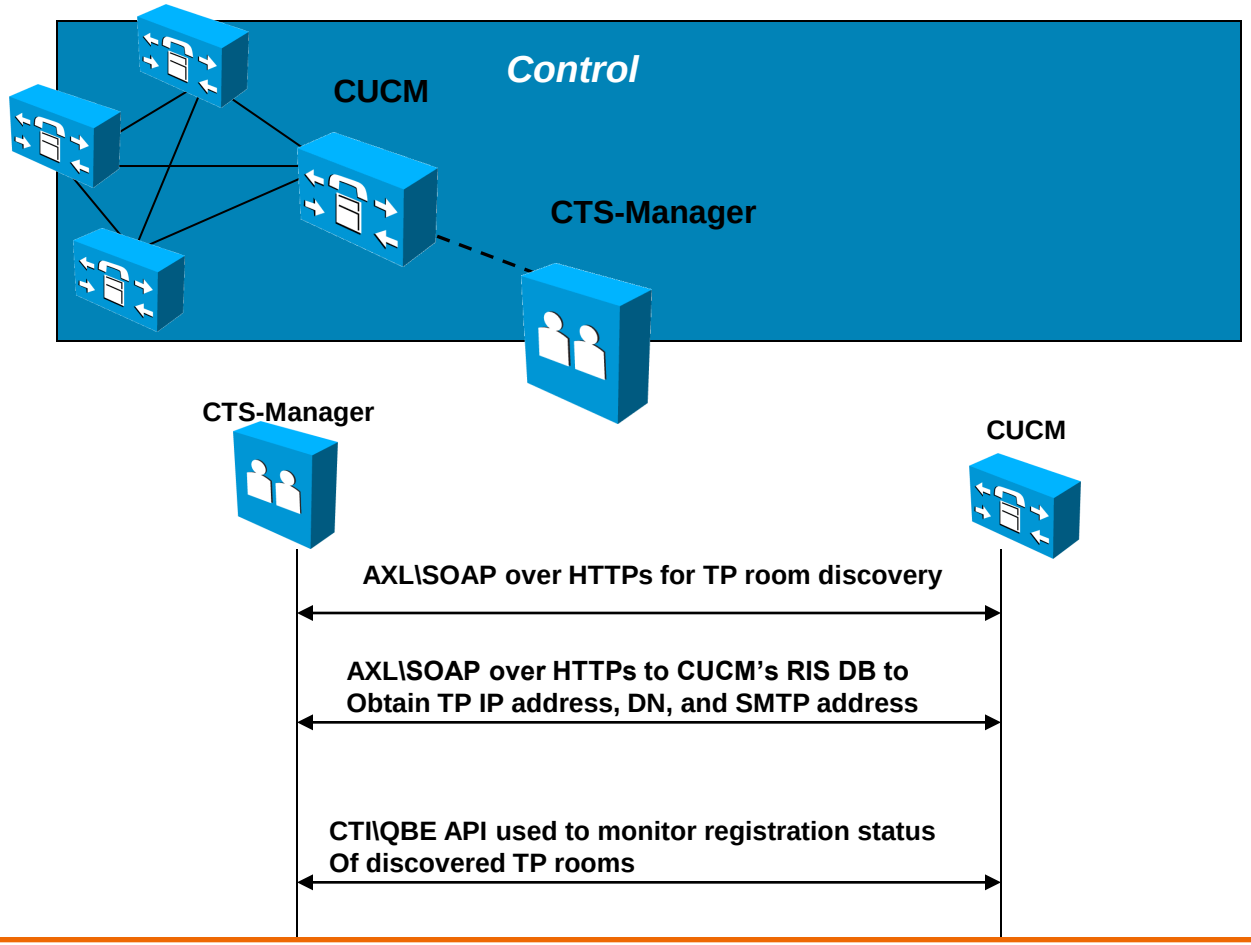
Cisco TelePresence Manager

CTS-Manager CUCM Integration



NOTE: No support for **Cisco Unified Communications Manager** redundancy until **Release 1.6**

Before **Release 1.6** **Cisco TelePresence Manager** could only communicate with a single **Cisco Unified Communications Manager** node, so that node must run both the AXL Web Service and CTI Manager service.

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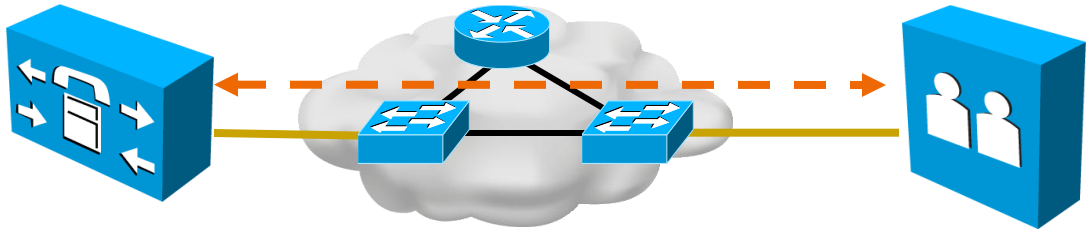
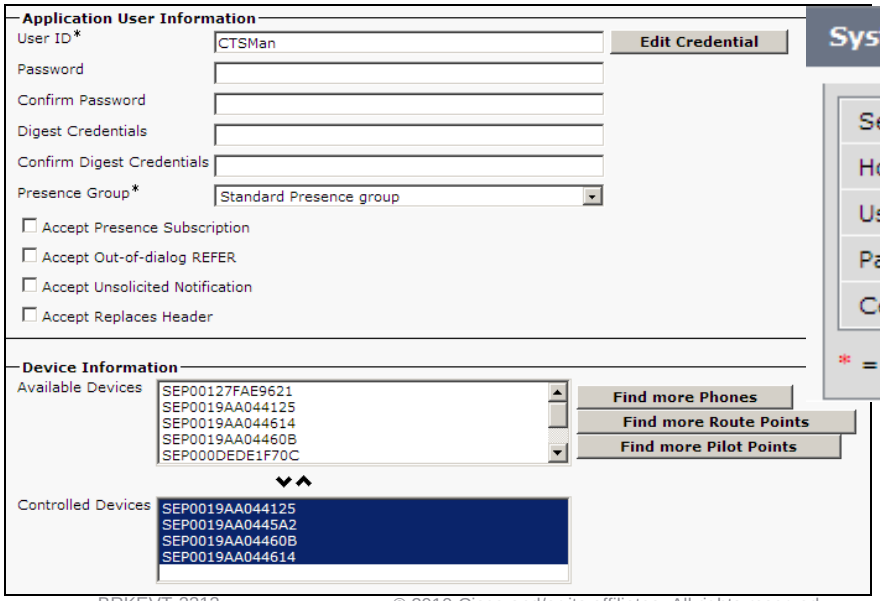
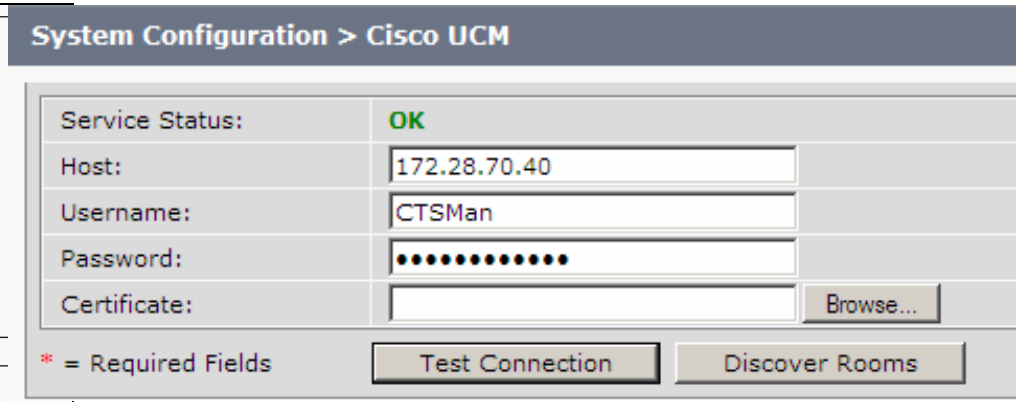
Cisco TelePresence CUCM Integration

Cisco TelePresence Manager



- CTS-Manager communicates with CUCM via AXL/SOAP and JTAPI





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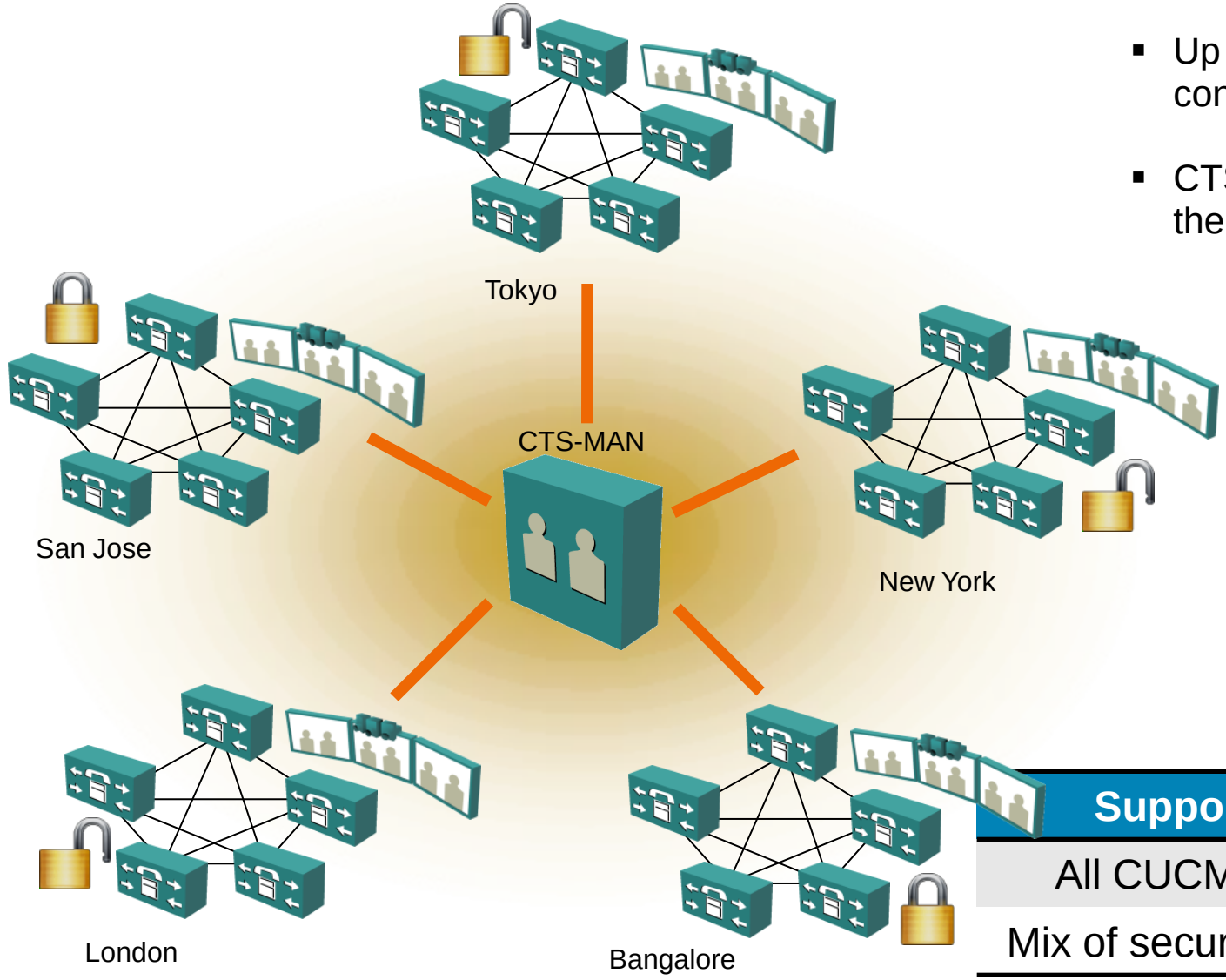
Cisco TelePresence CUCM Integration

Multi CUCM Cluster Support – since release 1.6



- Up to 5 CUCM cluster configuration supported
- CTS-MAN has CUCM info in the dashboard view

Supported Scenarios
All CUCM clusters secured
Mix of secured and non-secured

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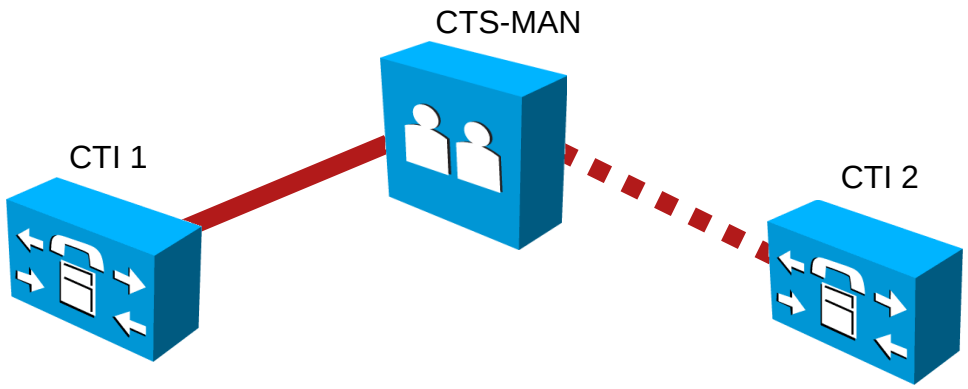
Cisco TelePresence CUCM Integration
Multiple CUCM Clusters – Release 1.6

- **CTI Manager failover now supported**



- **Inter-Clusters Trunks between CUCM clusters must be SIP. H.323 ICT trunks do not support TelePresence calls**
- **Duplicate MAC Address/Email address across clusters are identified**

  Rooms will be marked as Duplicates
- **CTS-MAN Dash board**

  Devices show consolidated CUCM clusters

  Service shows Discovery service status

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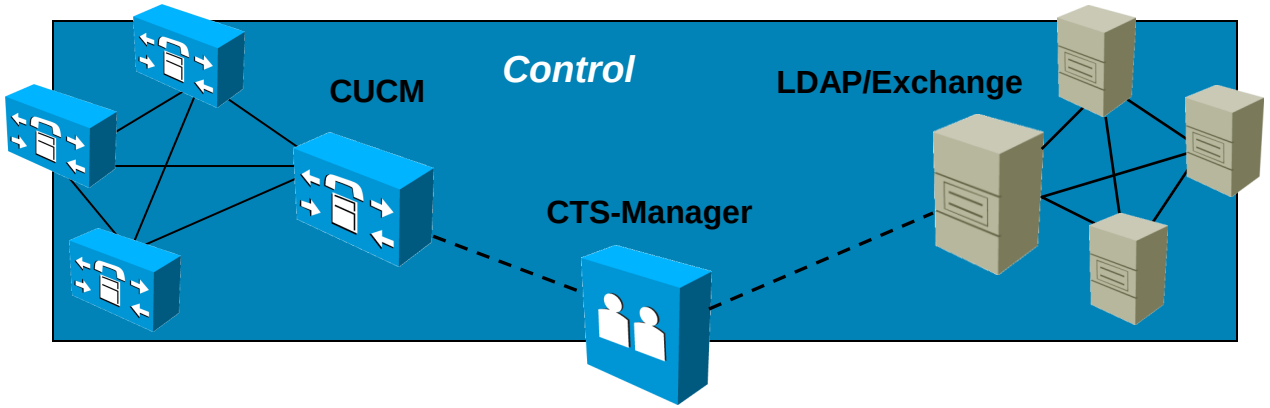
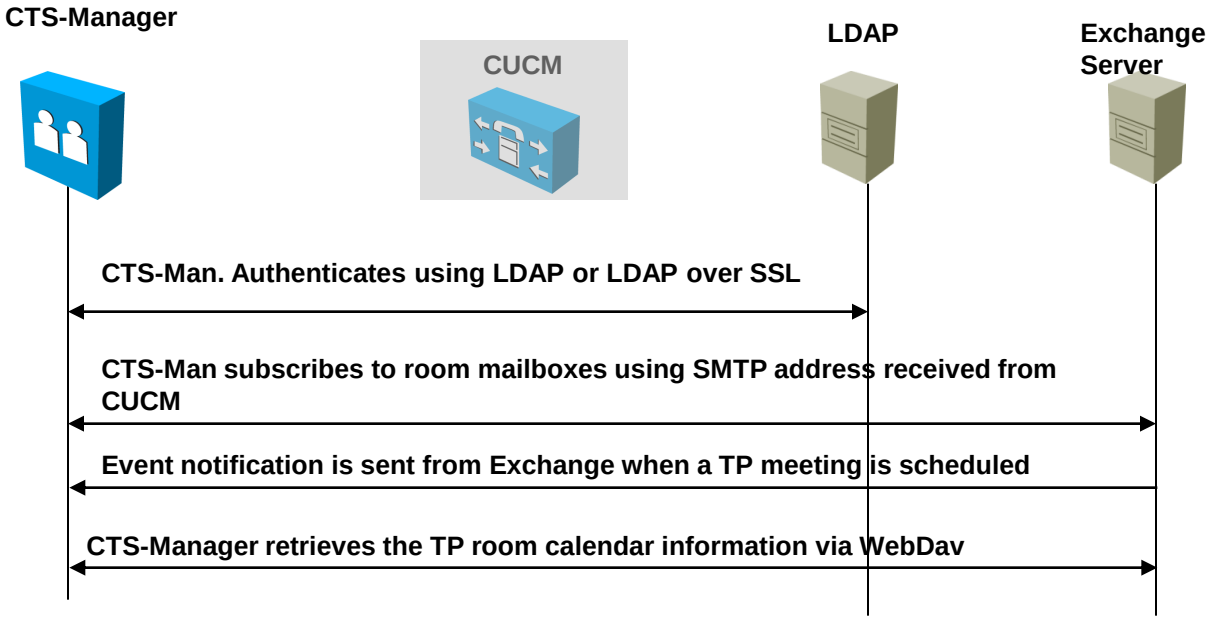
Cisco TelePresence Manager

CTS-Manager LDAP/Exchange Integration




CTS-Manager
CUCM
LDAP
Exchange Server
CTS-Man. Authenticates using LDAP or LDAP over SSL
CTS-Man subscribes to room mailboxes using SMTP address received from CUCM
Event notification is sent from Exchange when a TP meeting is scheduled
CTS-Manager retrieves the TP room calendar information via WebDav

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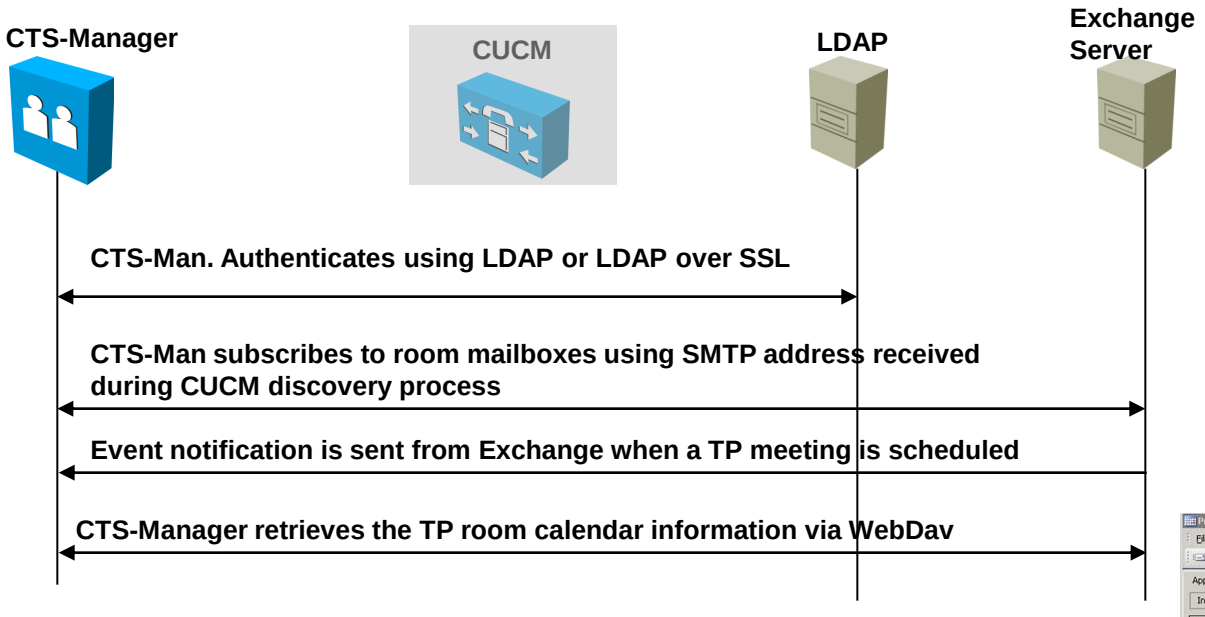
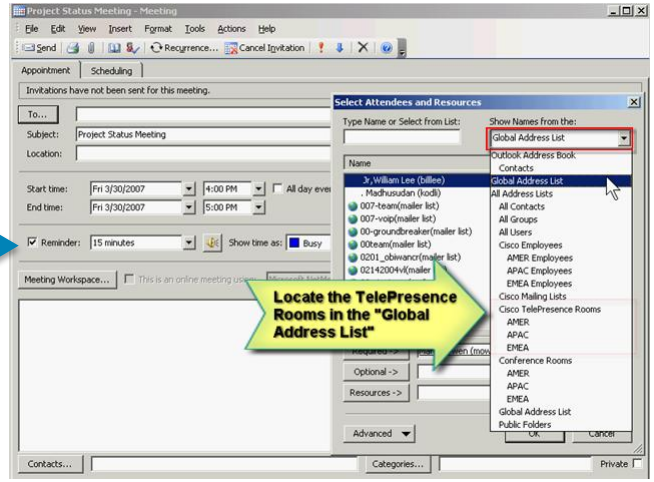
Cisco TelePresence Manager

CTS-Manager LDAP/Exchange Integration


CTS-Manager
CUCM
LDAP
Exchange Server
CTS-Man. Authenticates using LDAP or LDAP over SSL
CTS-Man subscribes to room mailboxes using SMTP address received during CUCM discovery process
Event notification is sent from Exchange when a TP meeting is scheduled
CTS-Manager retrieves the TP room calendar information via WebDav

Work with the right group in the enterprise to create mailboxes in Exchange and provide access to them by CTS-Man

User Schedules meeting by simply selecting the CTS rooms from address list


Project Status Meeting - Meeting
Select Attendees and Resources
Locate the TelePresence Rooms in the "Global Address List"

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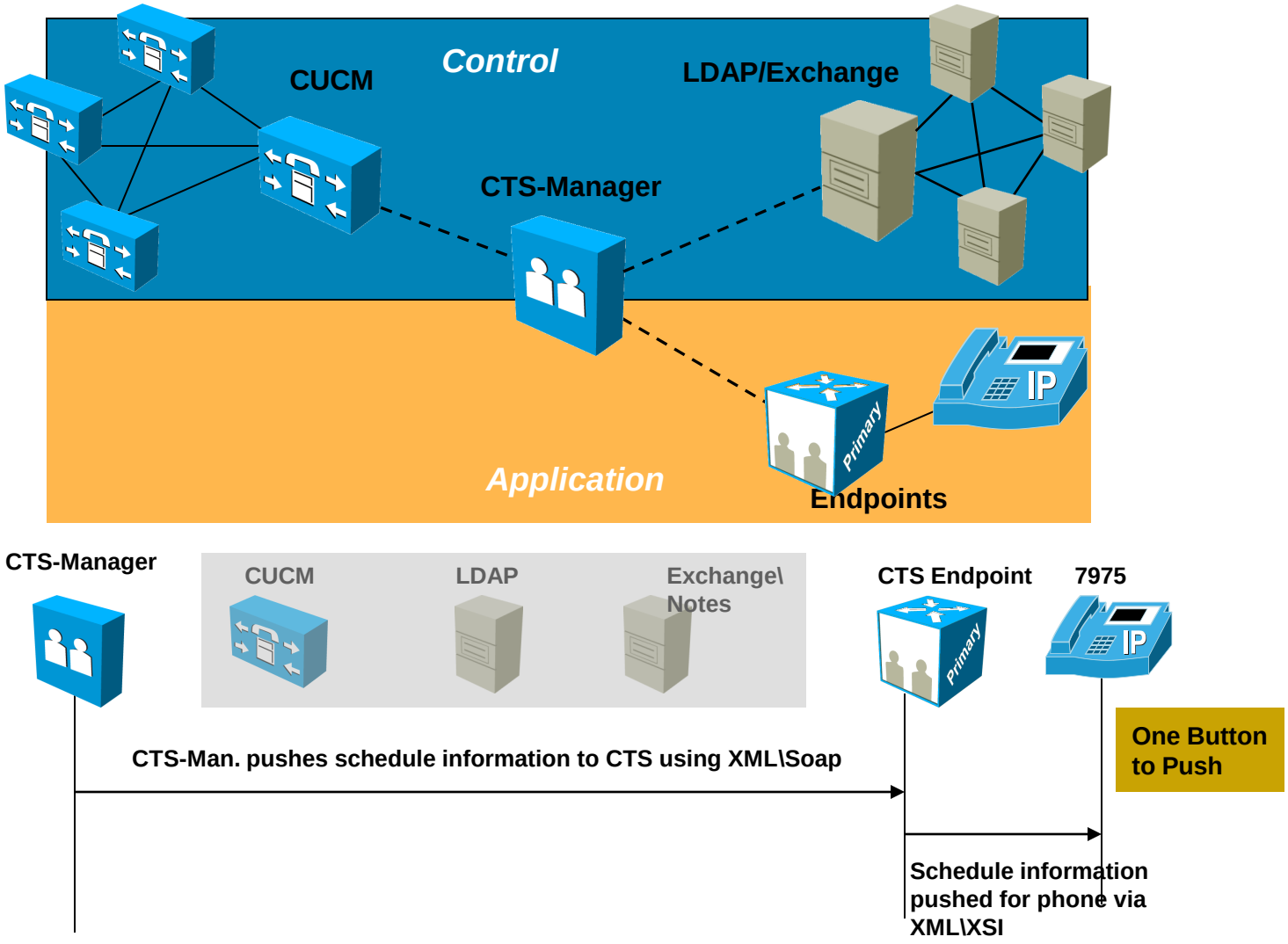
Cisco TelePresence Manager

CTS-Manager and CTS Integration



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Cisco Immersive TelePresence AGENDA

- Introduction to Immersive TelePresence
- Selecting and evaluating rooms
- System Components
- Scheduling
- Media Services for TelePresence
  - Multipoint meetings
  - Webex OneTouch
  - Interoperability
- Planning and preparing the network

  Is the network ready?

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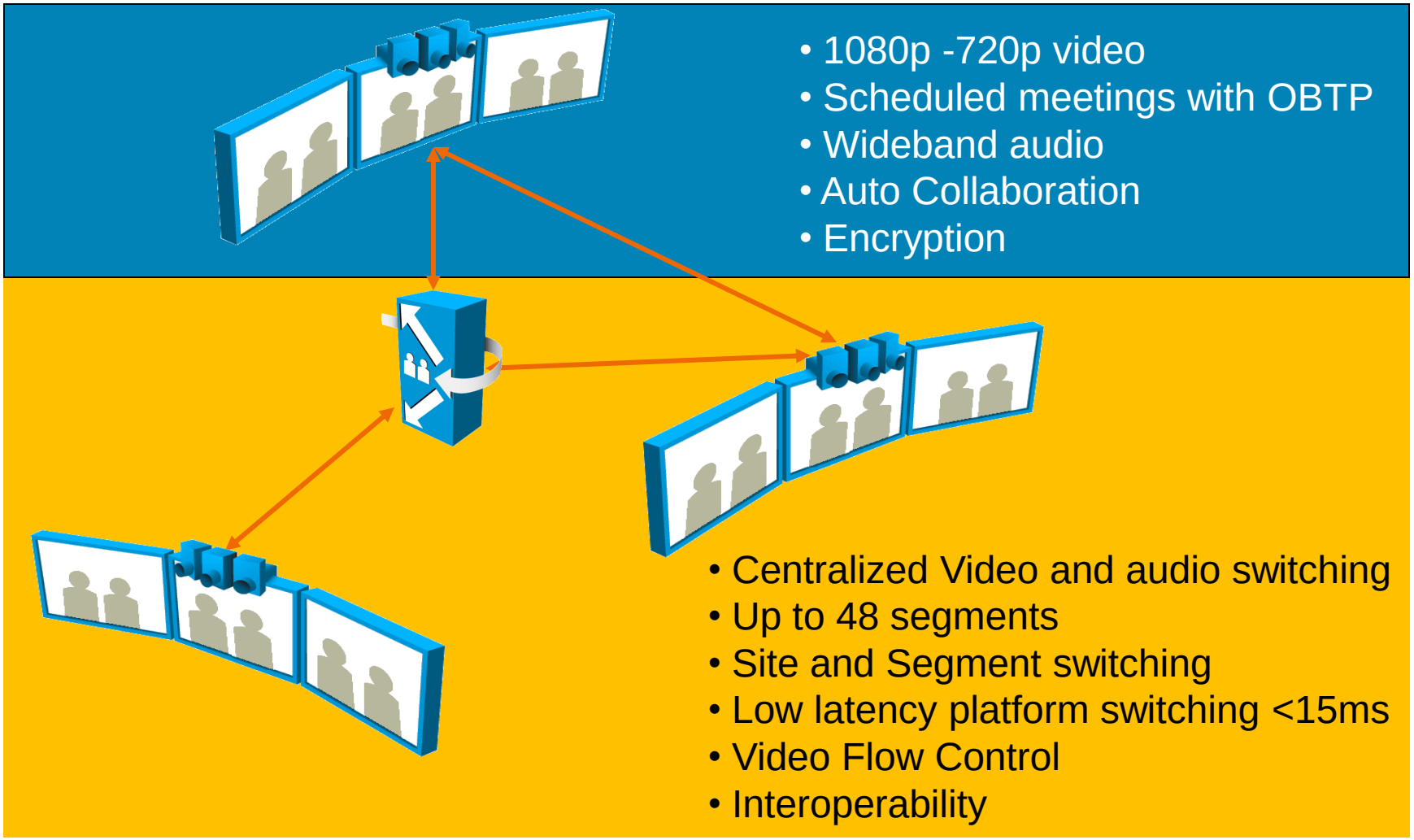
Cisco Immersive TelePresence

Cisco TelePresence Multipoint System (CTMS)


• 1080p -720p video
• Scheduled meetings with OBTP
• Wideband audio
• Auto Collaboration
• Encryption
• Centralized Video and audio switching
• Up to 48 segments
• Site and Segment switching
• Low latency platform switching <15ms
• Video Flow Control
• Interoperability

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Cisco TelePresence Multipoint Switch
System Features

- Software based Solution
- Integrated with Cisco TelePresence Manager
- CUCM communication via SIP trunk
- Scheduled and Non-Scheduled meeting support
- Voice Activated Switching
  - Speaker & Room
- Supports up to 48 table segments (16 CTS-3000\3200's or 48 CTS-1000/1100/1300/500's)
- H.264 -1080p, 720p, & CIF video support
- AAC-LD, G.722 & G.711 audio support
- Auto Collaborate Support
- Flow Control
- Distributed deployment with Geographical Selection (CTS-Manager required)

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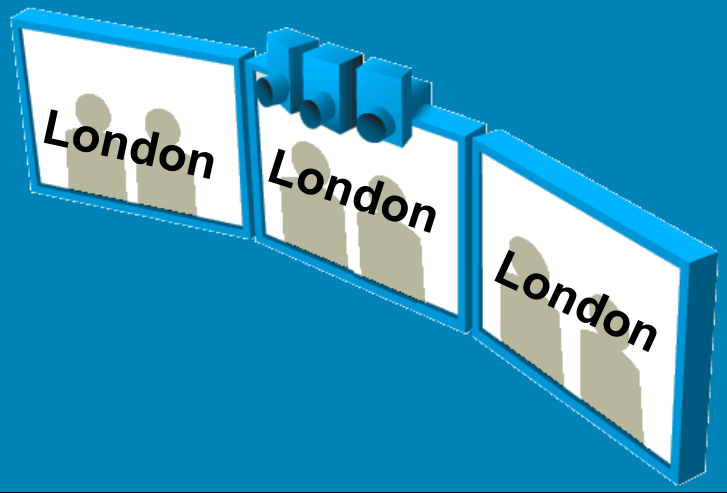
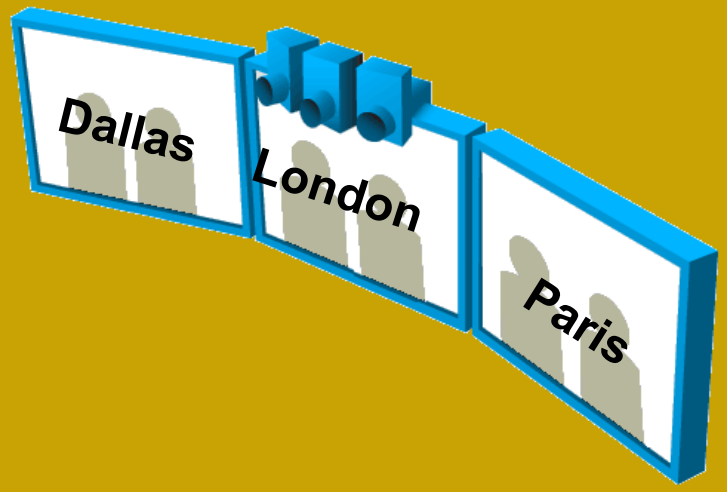
Cisco TelePresnce Multipoint Switch

Site (Room) and Segment (Speaker) Switching

Site Switching
Entire site switches



Segment Switching
Each segment switches independently



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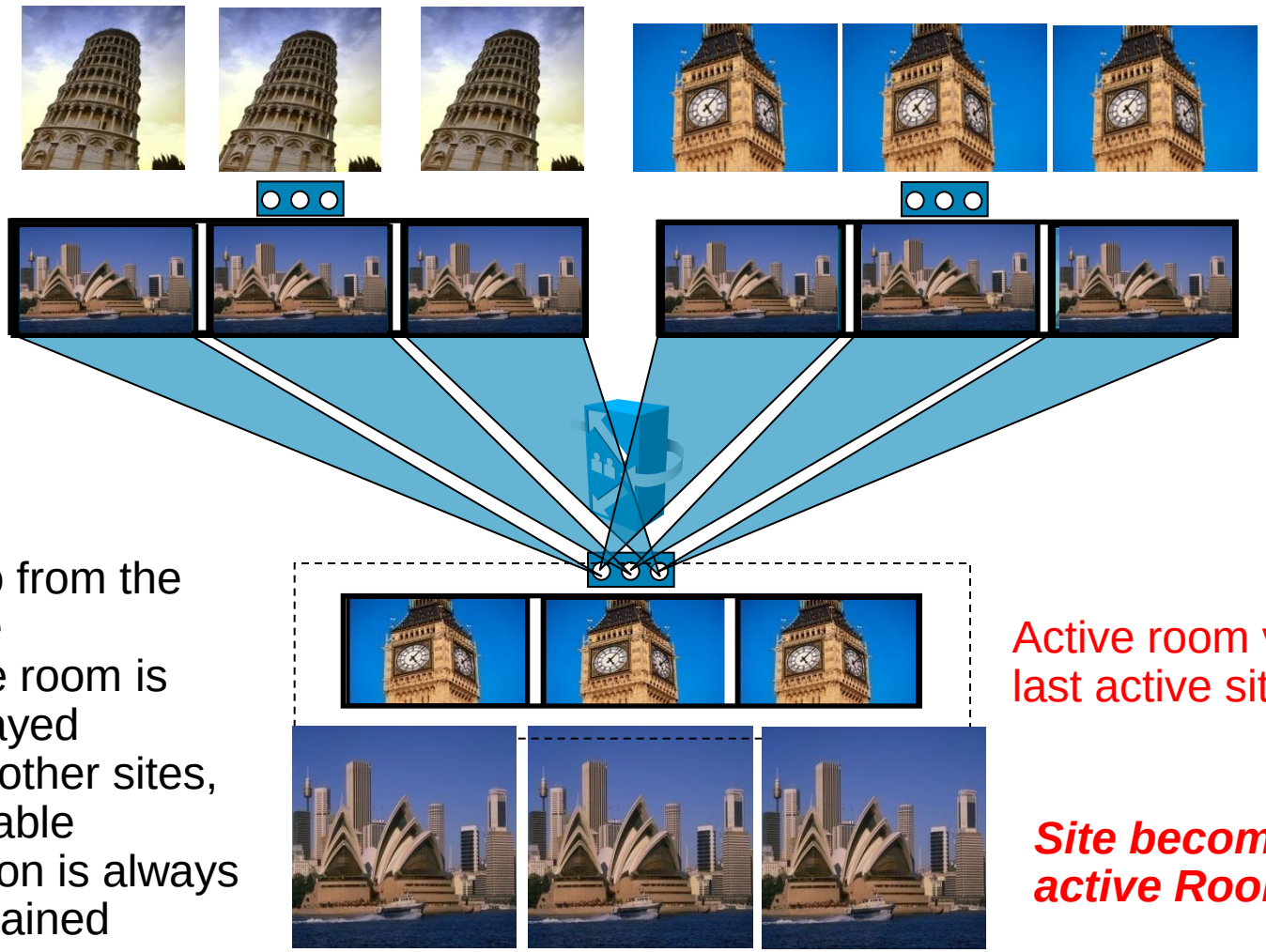
Cisco TelePresence Multipoint Switch

Room (Site) Switching



Previously Active Room

Active site

Video from the entire active room is displayed to all other sites, and table position is always maintained

Active room views last active sites video

Site becomes active Room

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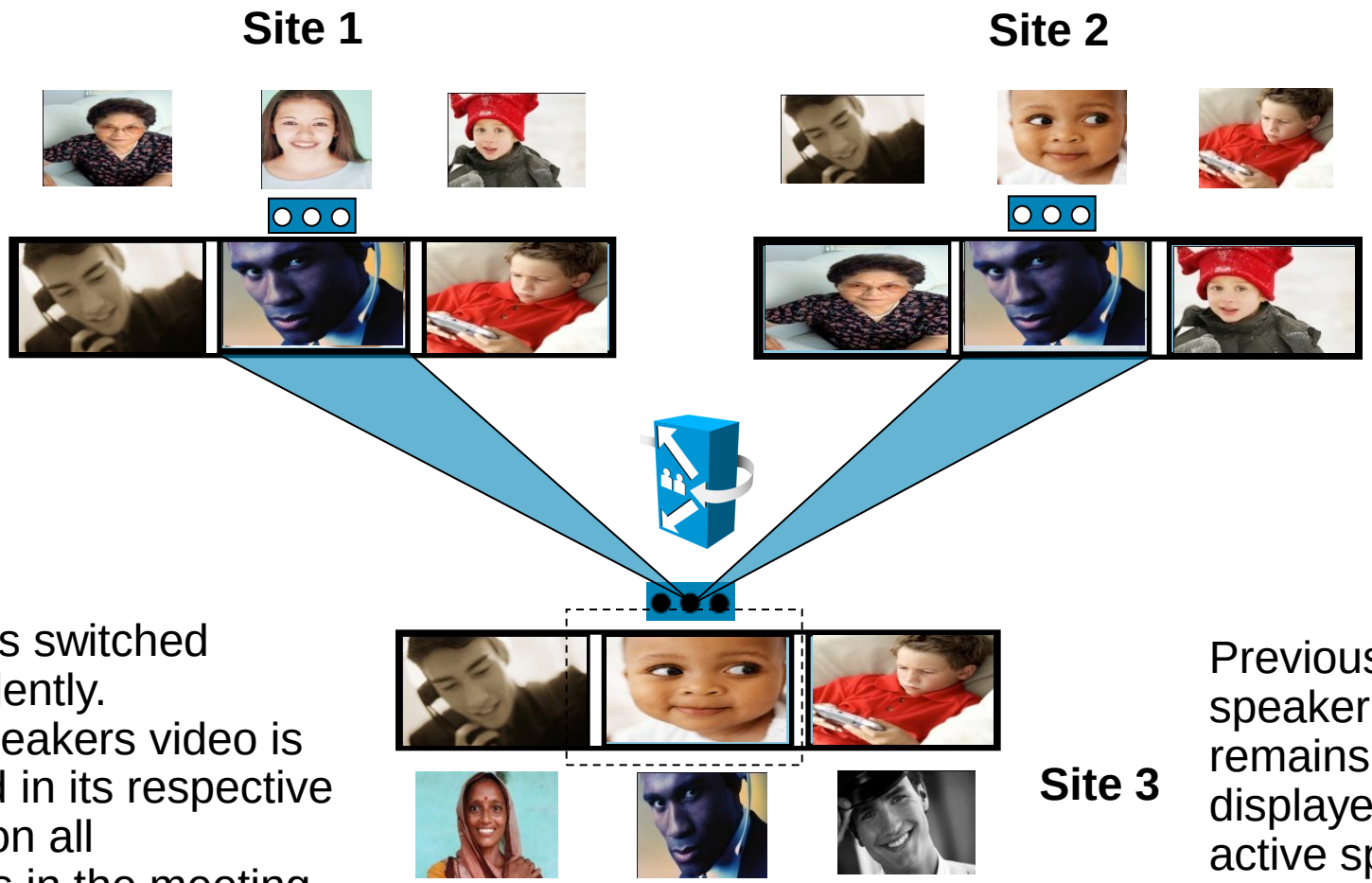
Cisco TelePresence Multipoint Switch

Speaker (Segment) Switching



Segments switched independently.
Active speakers video is displayed in its respective position on all endpoints in the meeting

Speaker goes active

Previously active speaker remains displayed for the active speaker

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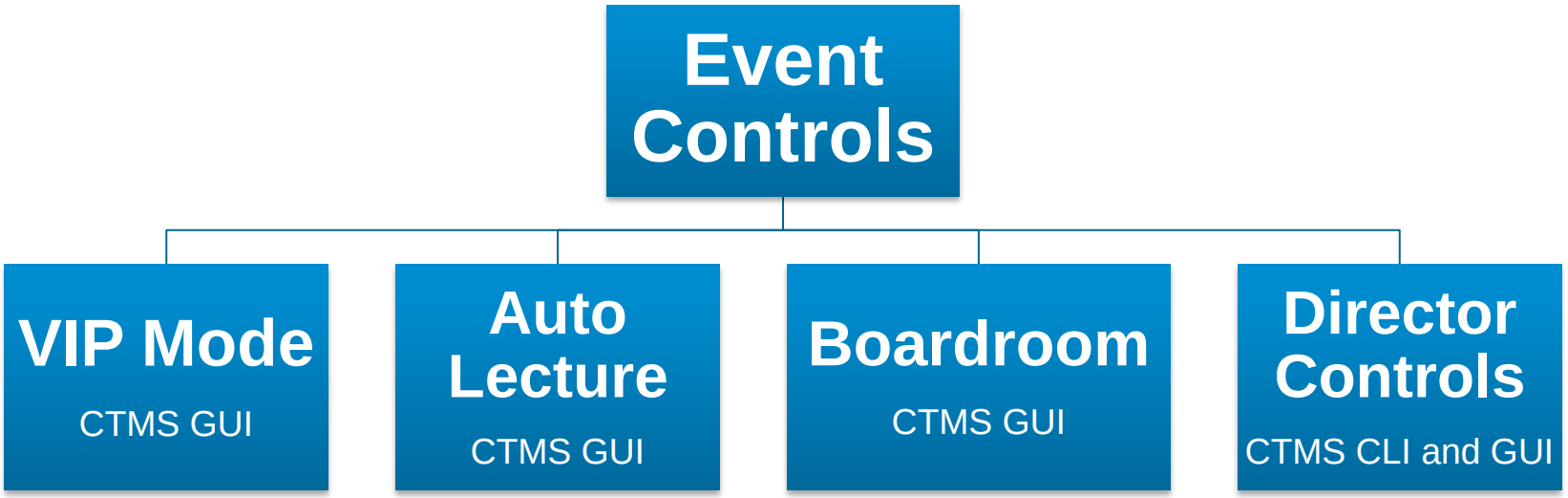
Cisco TelePresence Multipoint Switch

Event Control



- **VIP Mode **** – Allows segment or room to be locked in place during meeting

- **Auto Lecture** – Speakers who talk for a pre-configured amount of time are the "lecturer". All other endpoints will see the entire lecturer room, until different endpoint talks long enough to become "lecturer".

- **Boardroom** – Allows single CTS 3000 to act as "Boardroom" in a meeting. Requires specific layout of cameras and displays

- **Director Controls** – Full control on which segments are seen and where they are displayed. Also controls for muting and blocking video from specific endpoints

**** Available in CTMS 1.5**

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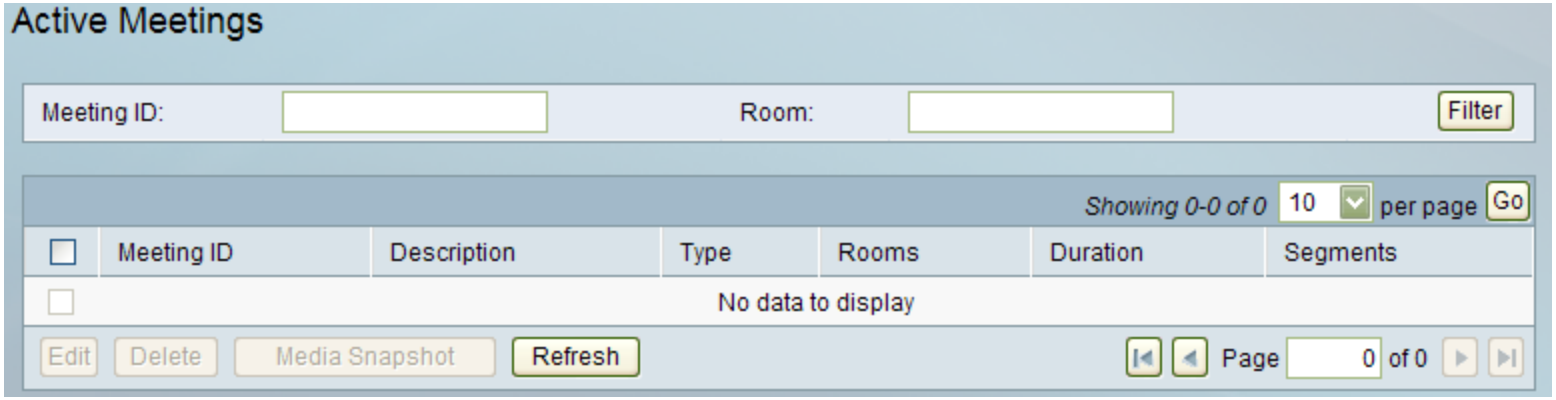
Event Control Web GUI

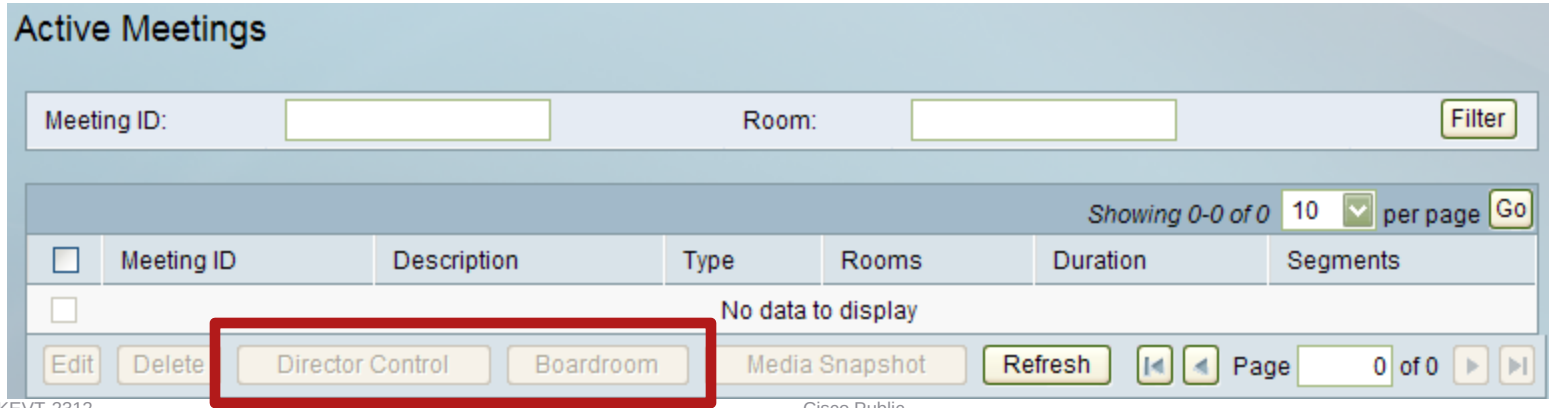
Accessible under Active Meetings



- **Enabled via CLI**

  set eventcontrol webgui <directorctrl/boardroom> <enable/disable>

- **Disabled by Default to Prevent Abuse**



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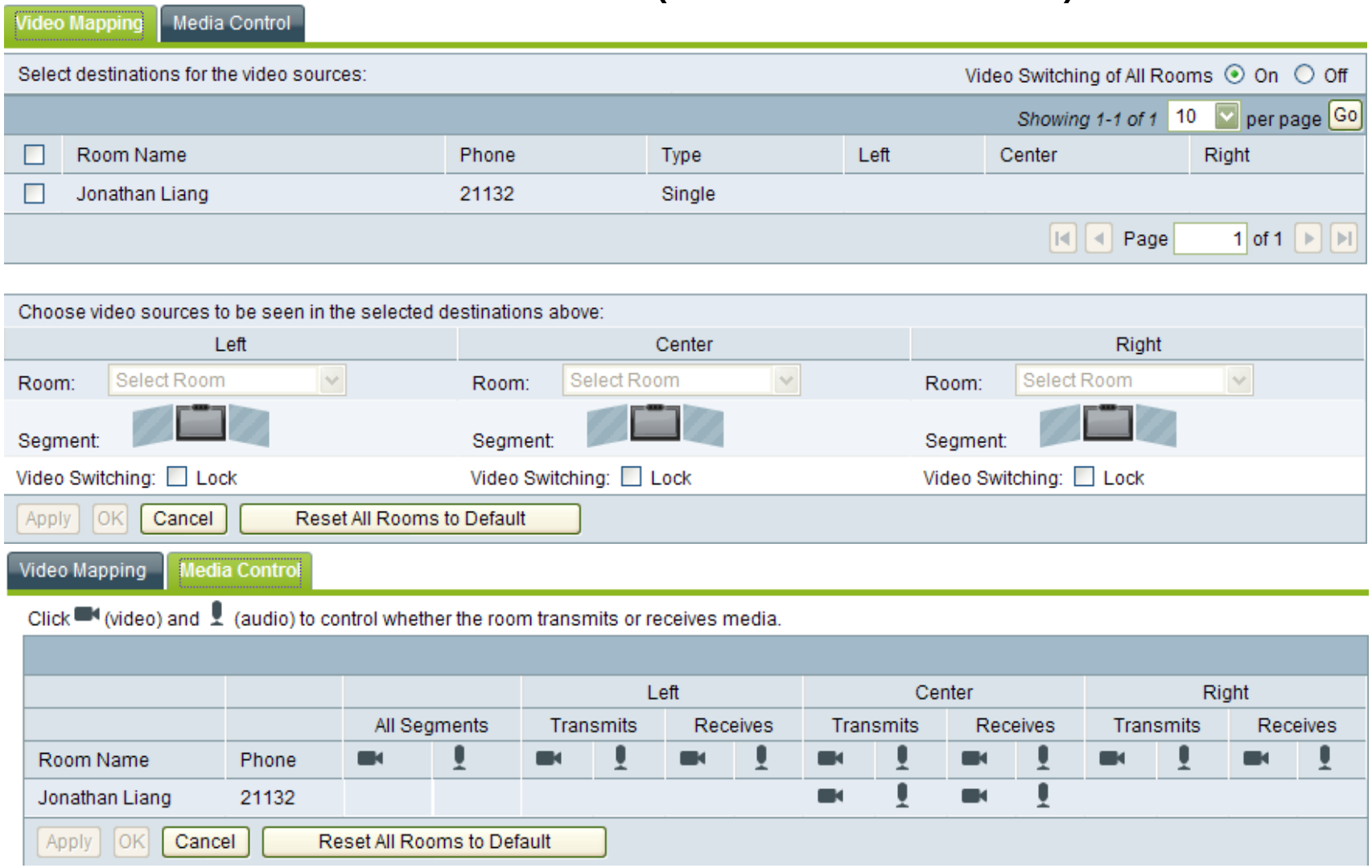
Event Control Web GUI

Director Control Interface (since release 1.7)



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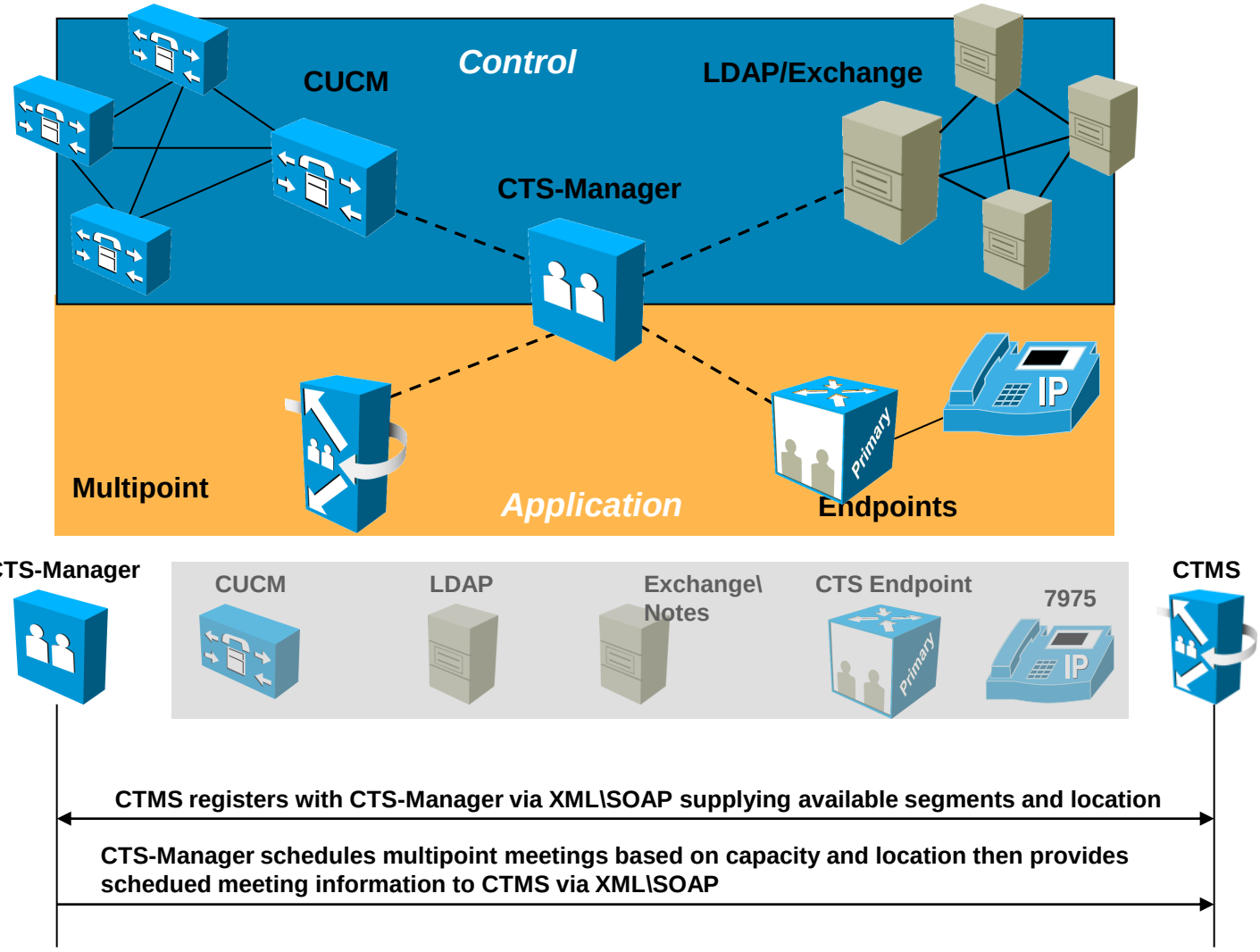
Cisco TelePresence Manager

CTS-Manager and CTMS Integration



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Cisco TelePresence Manager

CTMS Geographical Selection

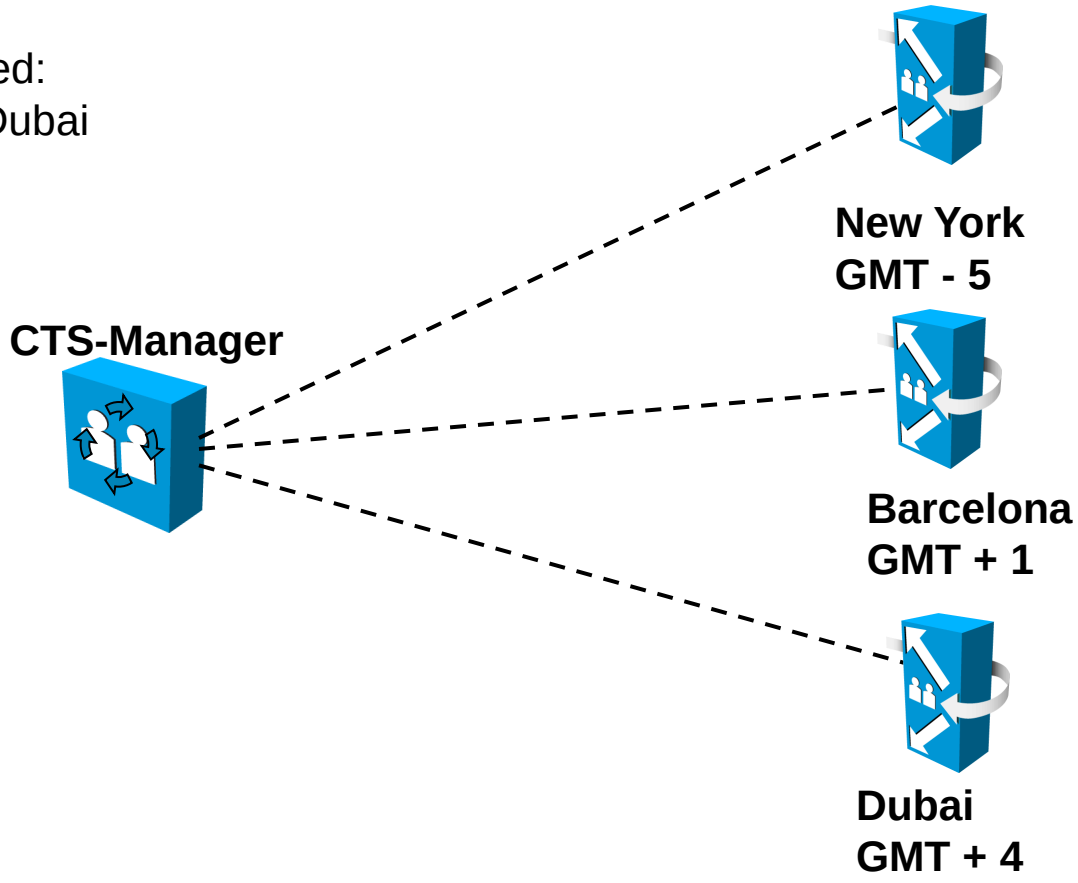
1. Multipoint meeting requested:
   New York, Barcelona and Dubai

2. System selection
   - NY: GMT -5
   - BA: GMT +1
   - DU: GMT +4
   - Av. GMT +0

   CTMS closest to mean GMT is selected

3. Check for available resources

4. Meeting scheduled successfully



Note: If no resources are available in Barcelona (GMT +1) the next closest CTMS is selected Dubai (GMT +4)

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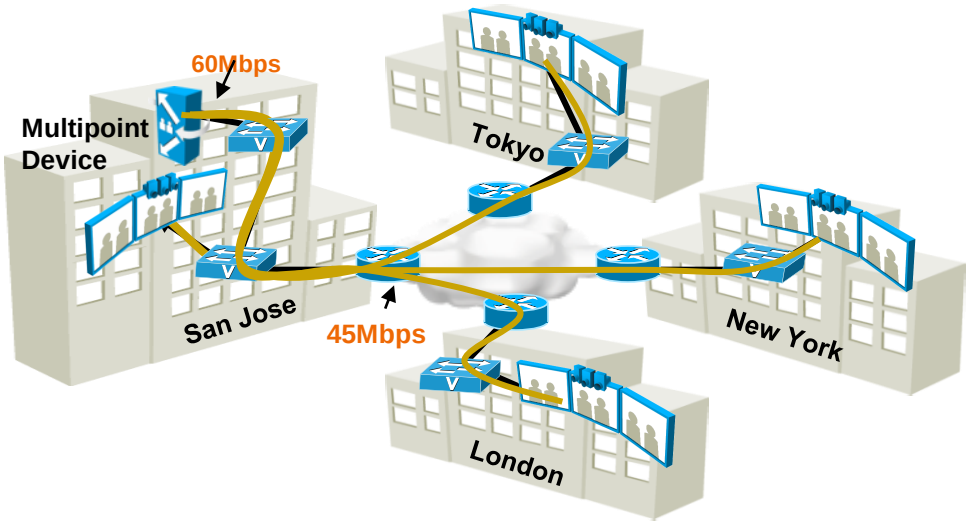
Cisco TelePresence Multipoint Switch

Multipoint Bandwidth Considerations

- Multipoint meetings are multiple point-to-point meetings
- Provision 5.5Mbps per table segment supported for 1080p
- Bandwidth must be provisioned for the max. number of segments supported on the multipoint device
- Distribute multipoint devices in larger deployments to help distribute network bandwidth



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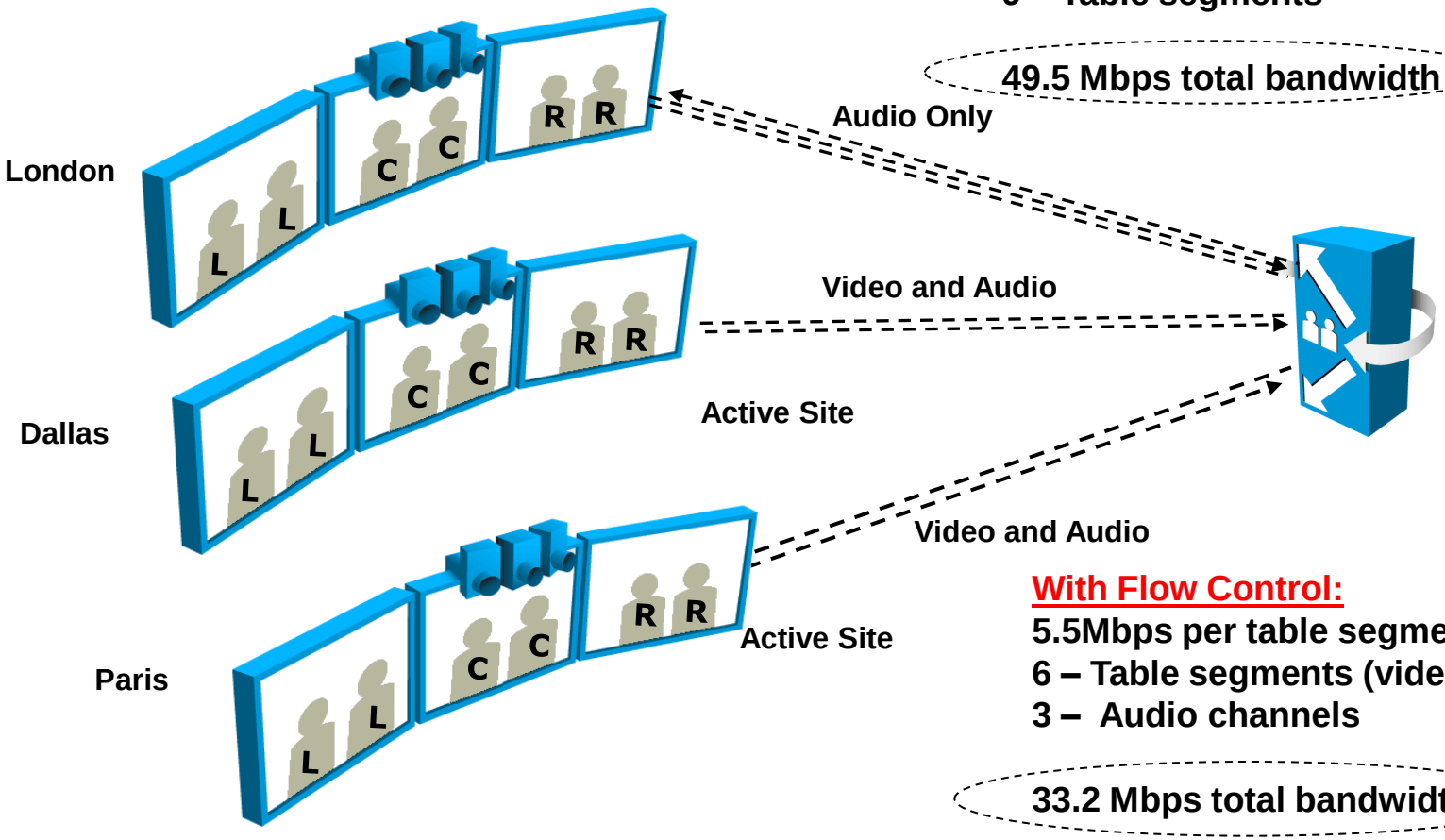
Cisco TelePresence Multipoint Switch

Flow Control



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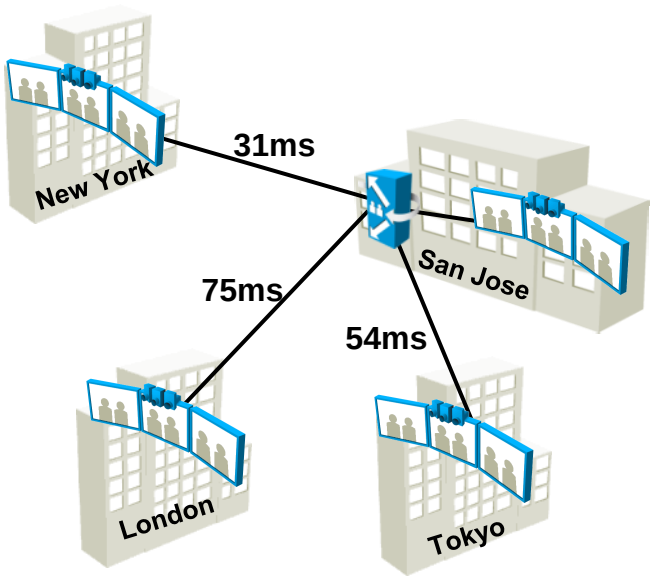
Cisco TelePresence Multipoint Switch

Multipoint Latency Considerations

- Target a maximum one way end-to-end network latency of <200ms
- For small deployments centrally locate multipoint resources
- Calculate worst case latency by adding the longest two legs plus 15ms for the CTMS



75ms
54ms
15ms
144ms

London to Tokyo

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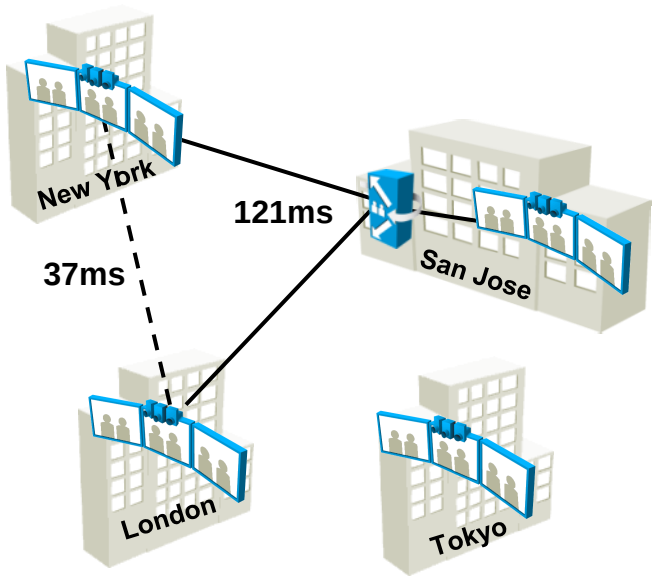
Cisco TelePresence Multipoint Switch

Multipoint Latency Considerations

- Target a maximum one way end-to-end network latency of <200ms
- For small deployments centrally locate multipoint resources
- Calculate worst case latency by adding the longest two legs plus 15ms for the CTMS



London – New York
- **Point-to-point 37ms**
- **Multipoint *121ms***

- Sites with relatively low latency point-to-point may have much higher latency with multipoint
- For Large deployments regionalize multipoint resources and manage meeting with CTS-Manager

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Cisco TelePresence Server with ActivePresence™

- Cisco MSE8000 Chassis
  (if customer has chassis, it can be used)
  - MSE8710 blade(s)
  - MSE8710 Screen licences
    (16 screens per blade)

- Cisco TS 7010, available as:
  - 16 screen appliance
  - 9 screen appliance with option to upgrade using a software license key to 16 screens

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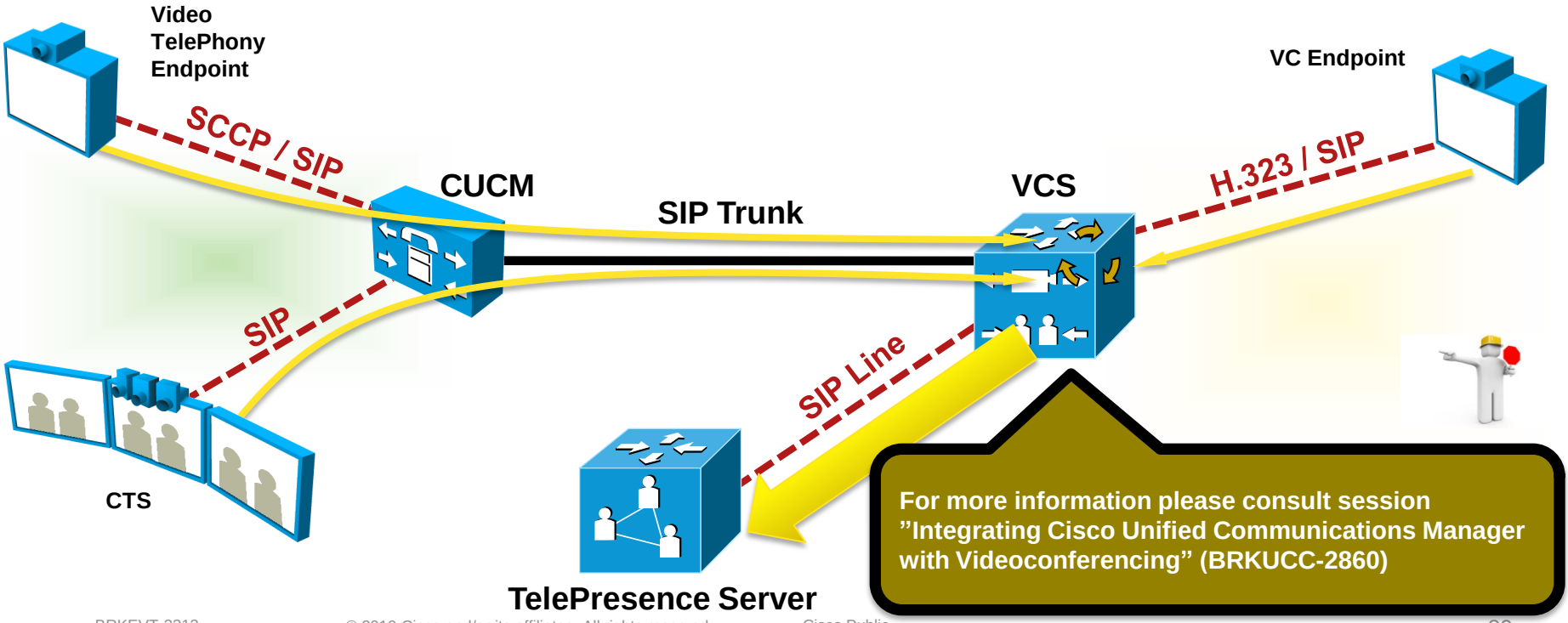
Cisco TelePresence Server
Signaling Flow

Device Type	Signaling	
CTS 1X00/3XX0/500	SIP	Registered to CUCM, Routed through VCS
Other Endpoints	SCCP/ H.323 / SIP	Registered to CUCM or VCS, Routed through VCS
TelePresence Server	SIP	Registered to VCS (per Conference)



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Cisco TelePresence Server

Media Flow

CTS Immersive Endpoints

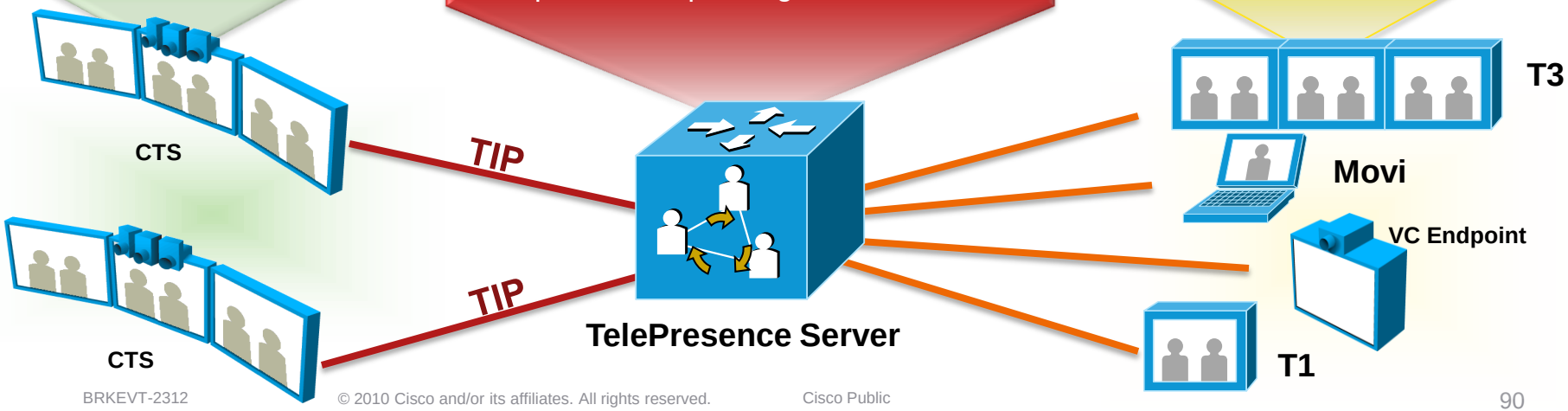
- **Triple or Single Screen**
  - CTS-500/CTS-1X00
  - CTS-30X0/CTS-32X0
- **Media Negotiated to TIP**
  - Channel Multiplexing
  - Auto Collaborate

Telepresence Server

- **Host TelePresence Meetings**
- **Media Capability**
  - Up to 720p
  - Auto Collaborate & H.239
  - TIP with CTS
    - Statically Enabled Based on Endpoint DN
  - Others
    - Traditional Media Capability Exchange
    - Separate Call per Segment

Other endpoints

- **Triple or Single Screen**
  - Cisco TelePresence T1/T3
  - Regular VC Endpoints
- **Media Capability**
  - Traditional Exchange
  - SDP over SIP
  - H.245
  - Up to 720p + H.239



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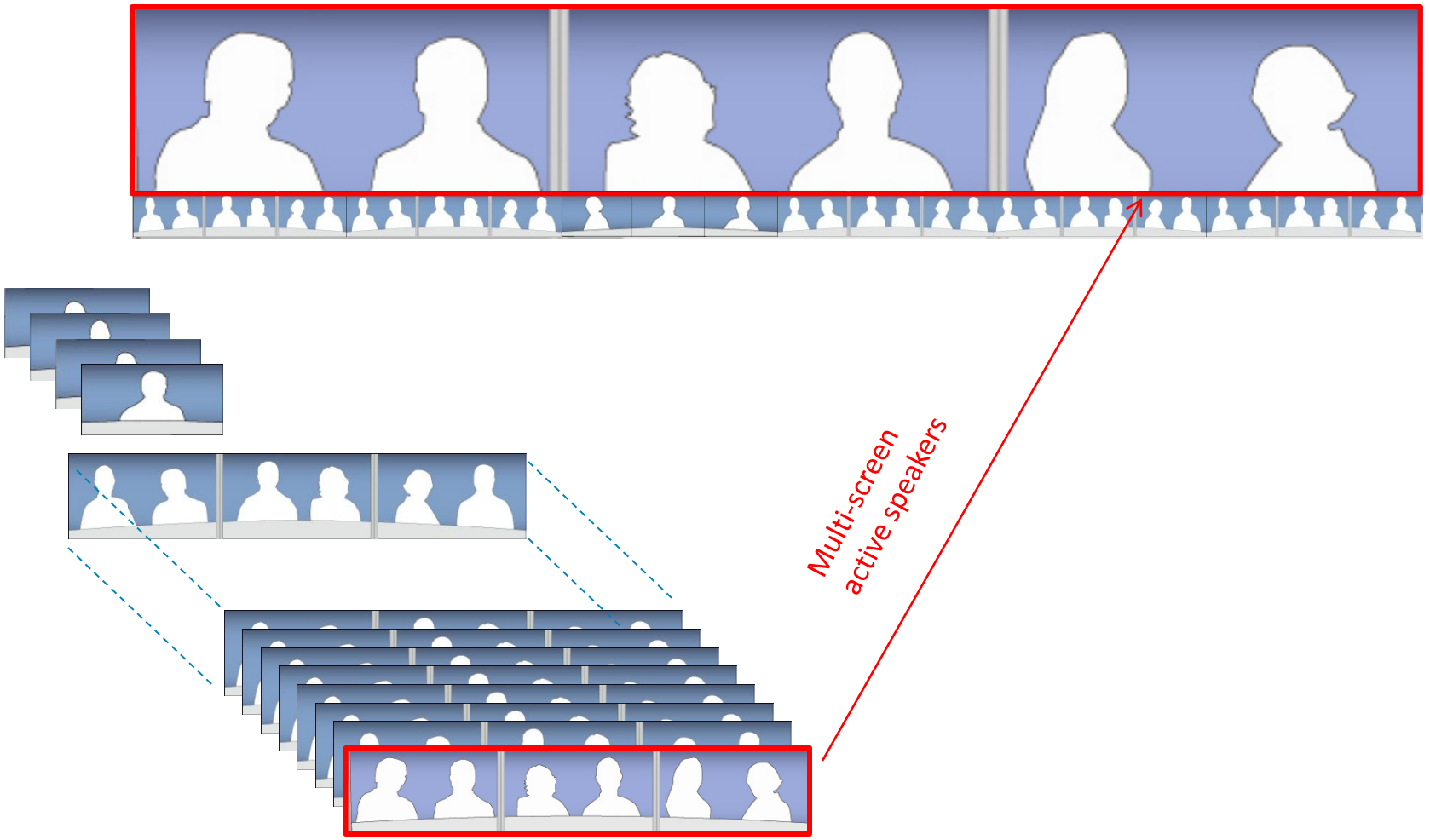
Cisco Immersive TelePresence in the Enterprise

TelePresence Server (user experience)

Cisco ActivePresence™

Cisco ActivePresence™ in action

...an example



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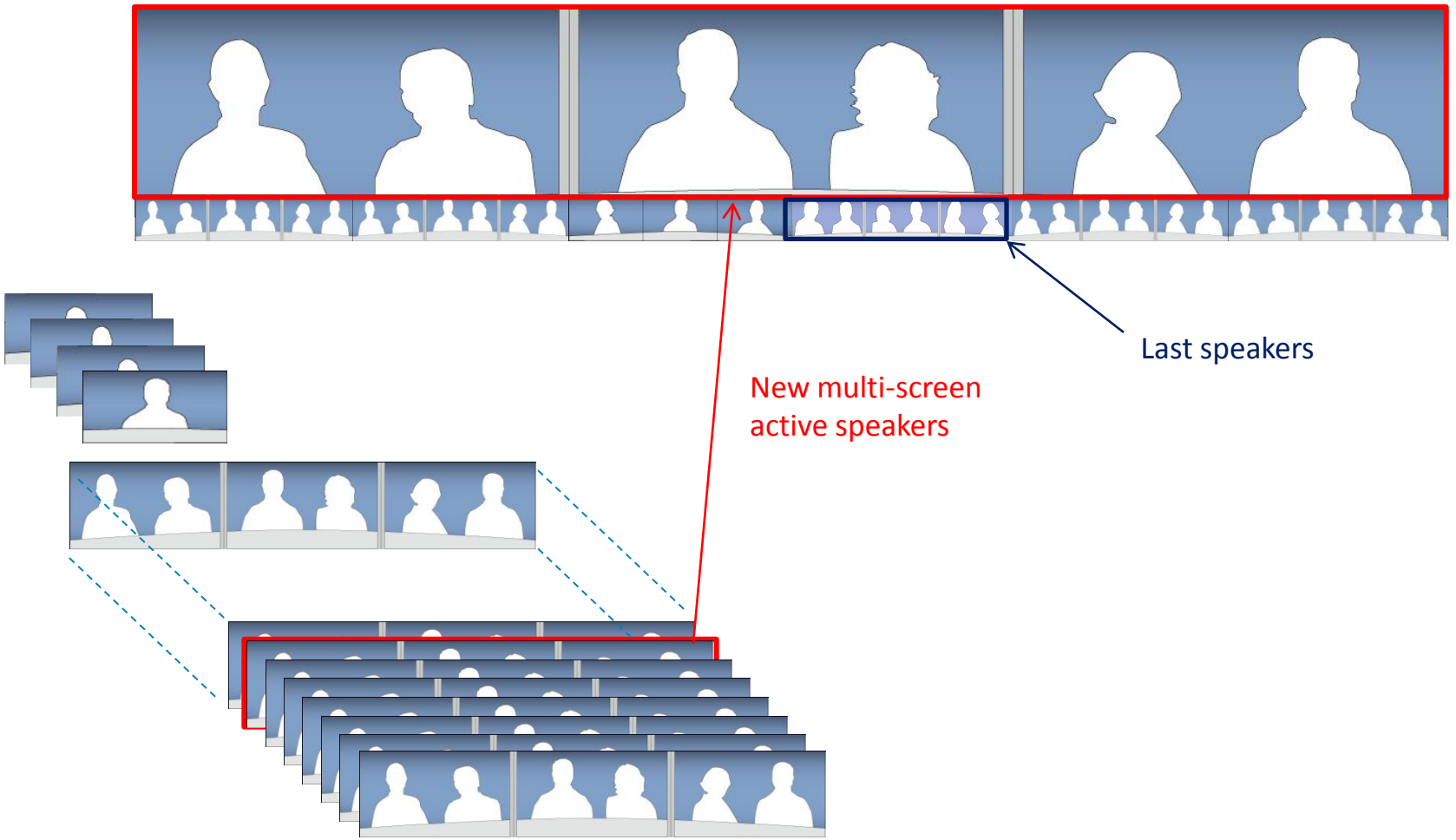
Cisco ActivePresence™ in action

...an example



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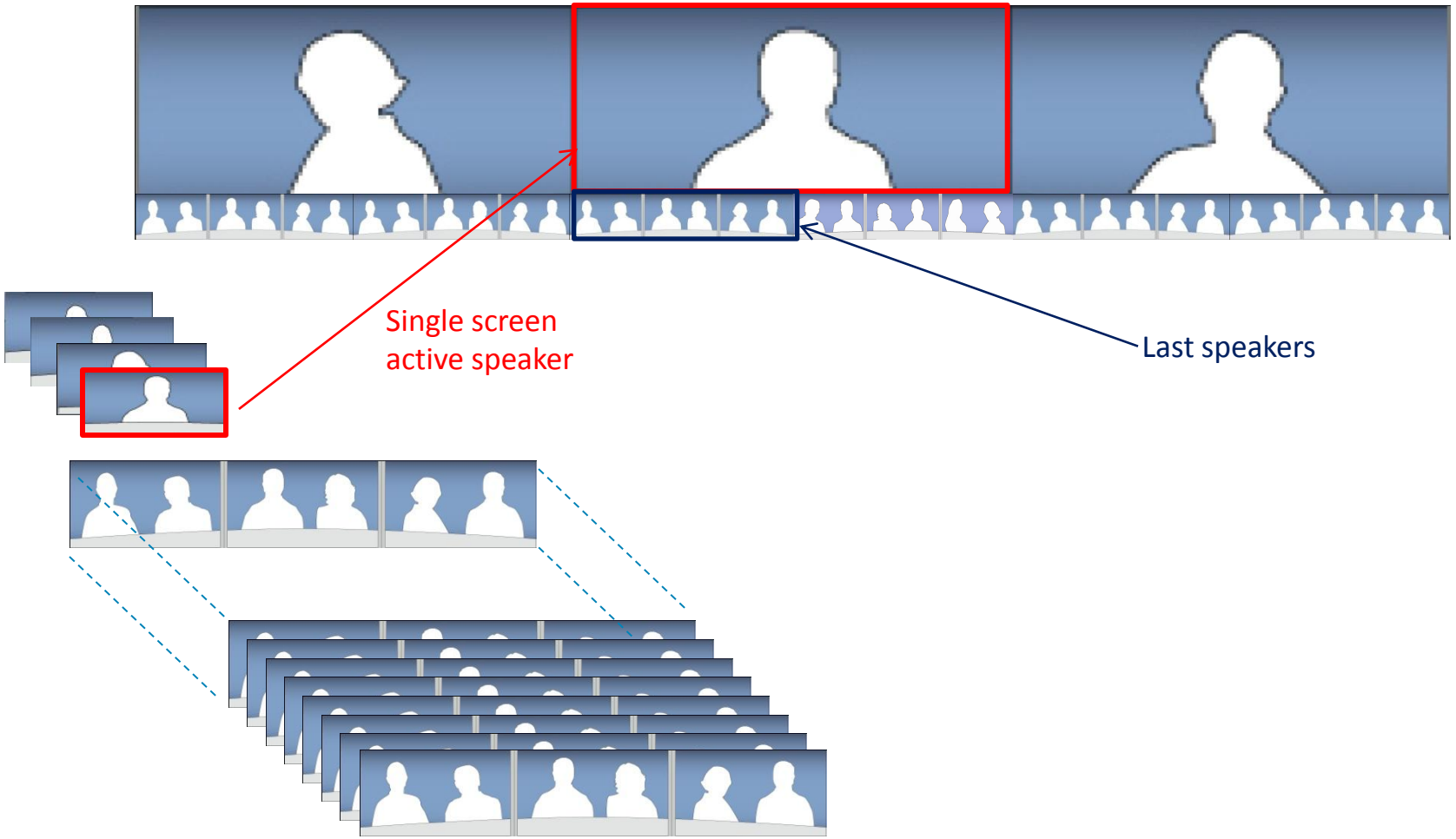
Cisco ActivePresence™ in action

...an example



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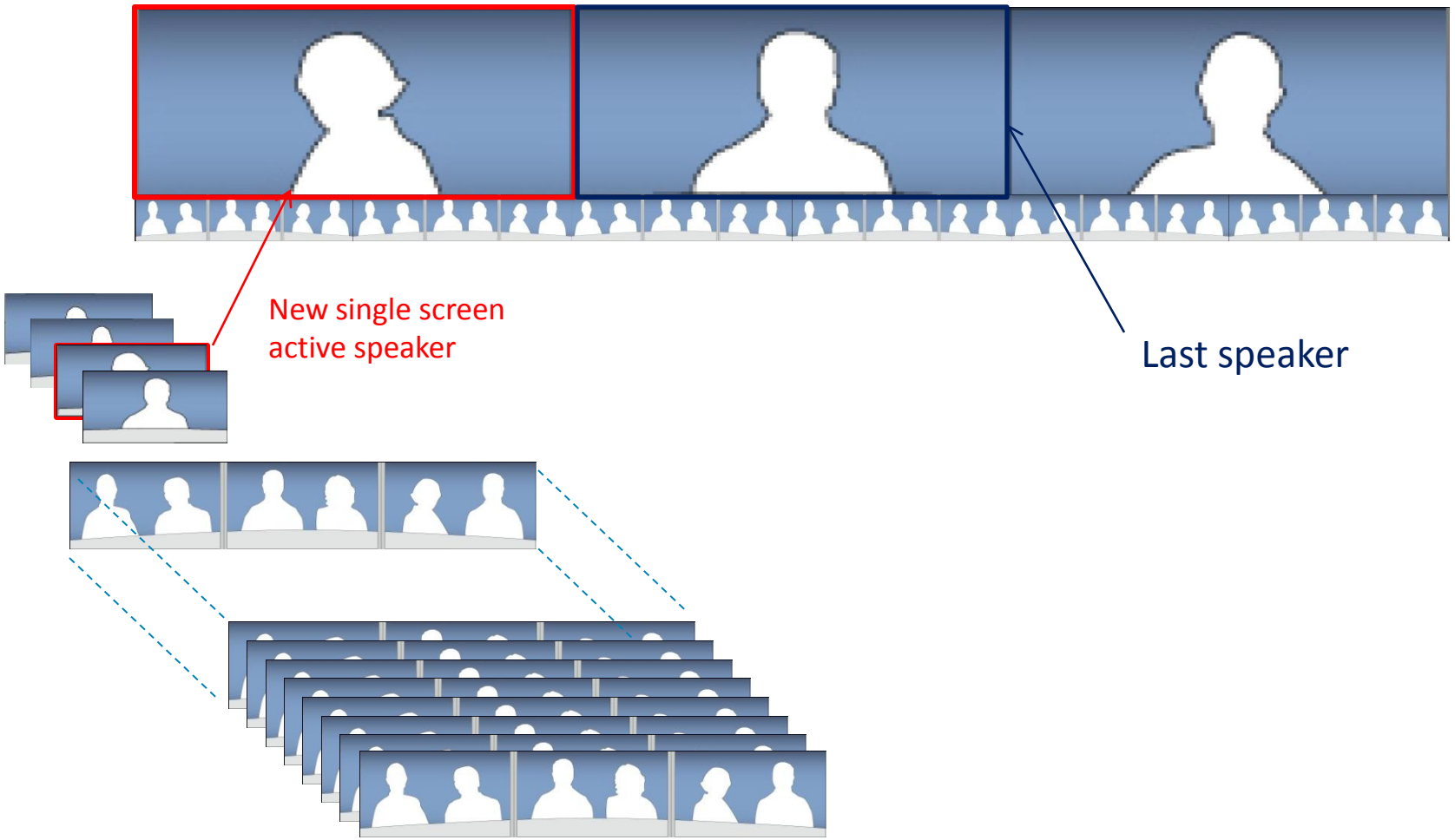
Cisco ActivePresence™ in action

...an example



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  Is the network ready?

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Cisco TelePresence in the Enterprise

Media Services: WebEx OneTouch

- Integrate Cisco TelePresence and Cisco WebEx to one solution
- Attend meetings using the most accessible collaboration technology
- Improve user experience and productivity
- OBTP TelePresence and WebEx
- Simplified scheduling

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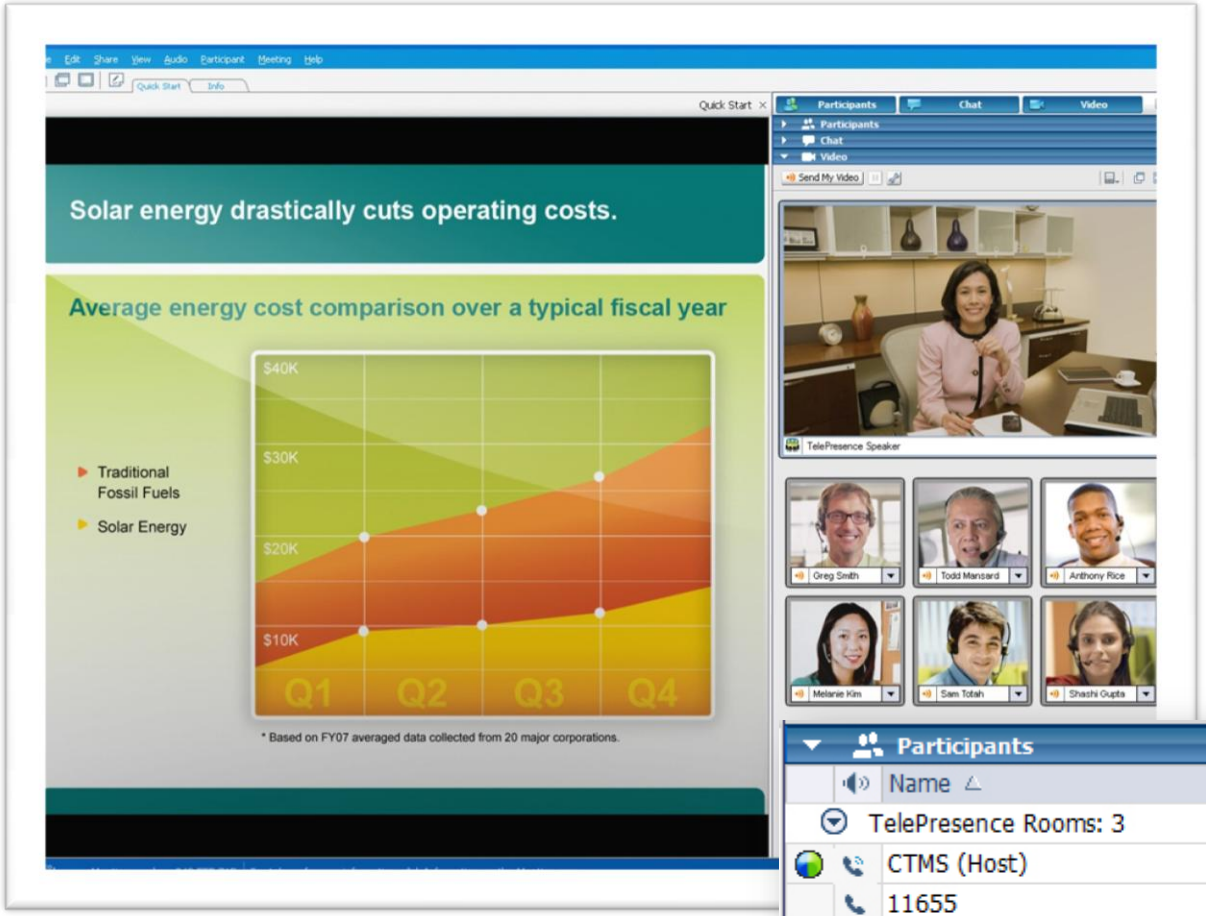
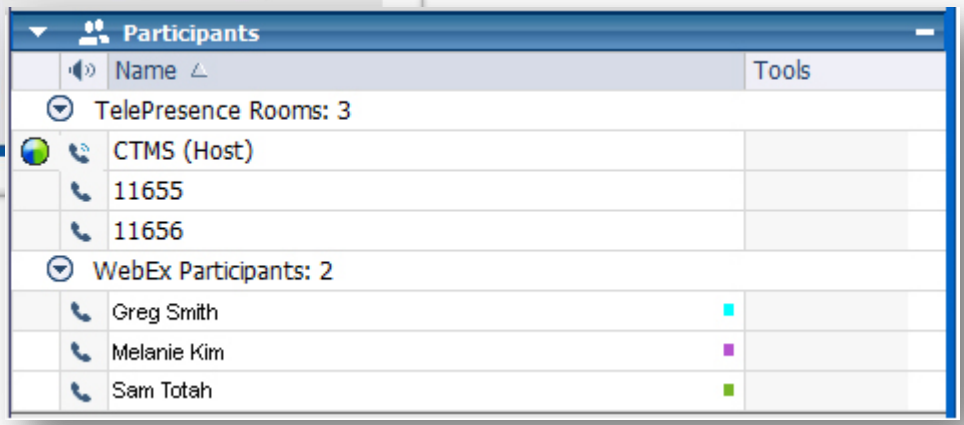
Cisco TelePresence WebEx OneTouch

WebEx Client User Experience



Video of the active speaker form the TelePresence room
Cropped CIF → 16:9

Video of participants joining via WebEx



Integrated participant list with active speaker indication

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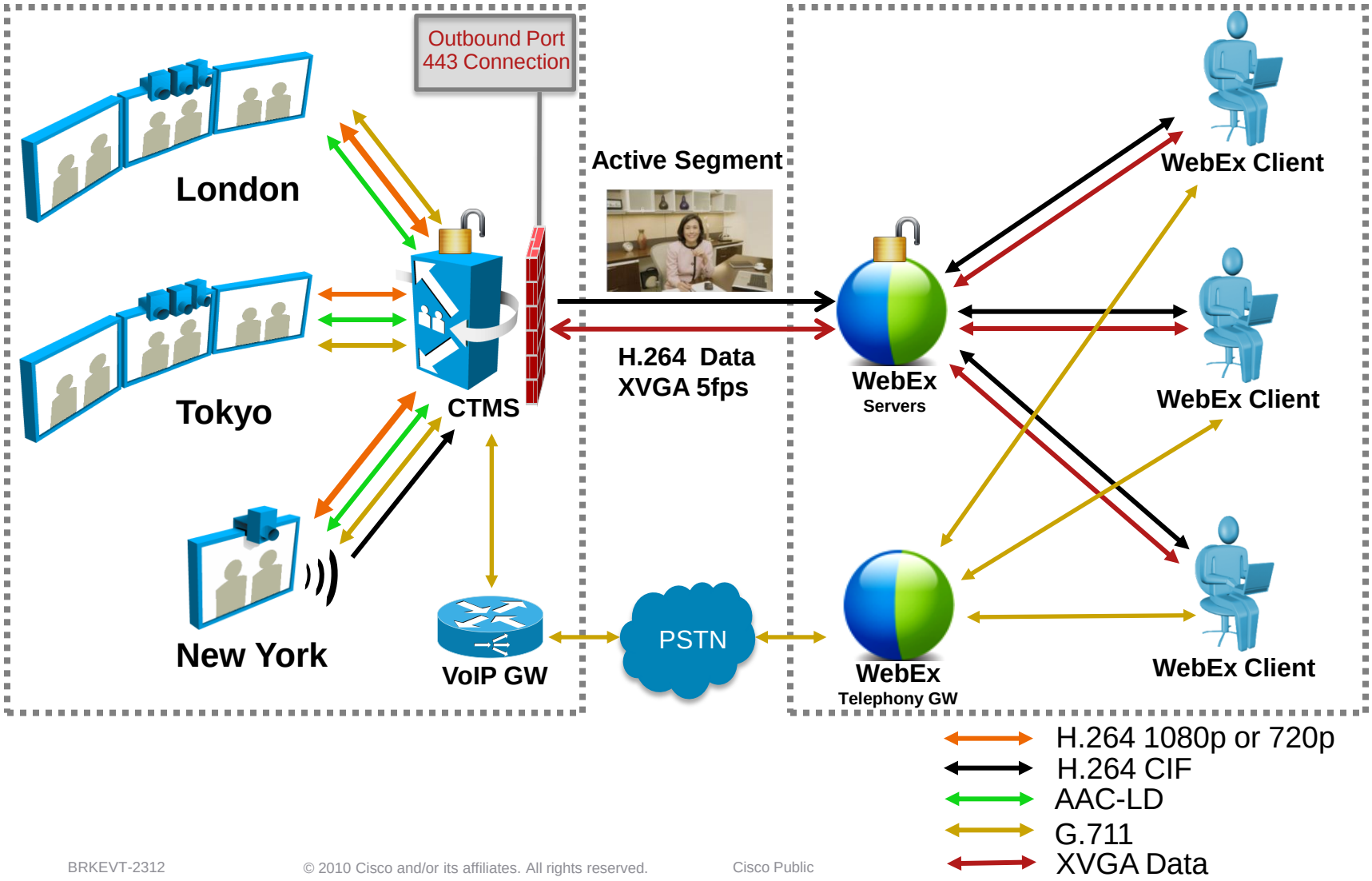
Cisco TelePresence in the Enterprise

Media Services: WebEx OneTouch



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Cisco TelePresence in the Enterprise

Media Services: WebEx OneTouch

Every meeting that includes WebEx is now a CTMS meeting

WebEx enabled meeting takes up 1 more port in CTMS

PSTN Gateway is required if there isn't one deployed

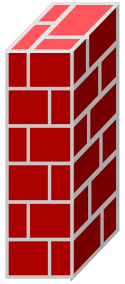
All audio calls have 1 number per CTMS

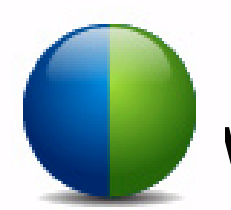
Max 24 simultaneous audio calls need to be supported per CTMS

Meeting scheduler needs to do a one time registration

Need to specify WebEx account info in CTS-MAN

Outbound TCP 443 SSL Connection through Firewall





Schedule a Meeting

WebEx Plug-in is not used for scheduling of WebEx OneTouch

Users need to be notified not to use the plug-in for this integration

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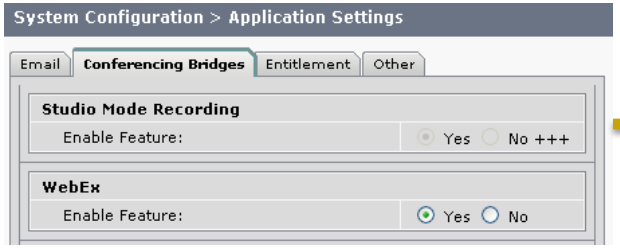
Cisco TelePresence in the Enterprise

Media Services: WebEx OneTouch

- **CTMS running 1.7**
  - **Configure WebEx Site information in the admin page**
- **Add trunk and route pattern in CUCM to route audio calls from PSTN to CTMS**
- **CTS-MAN running 1.7**
  - **Configure WebEx Site details under conferencing devices**
  - **Enable WebEx Feature**
  - **All CTS and CTMS configured should be running 1.7**
  - **Only 1 WebEx Site supported**



- **Schedule WebEx Enabled meeting and launch both TelePresence and WebEx with a push of a button**

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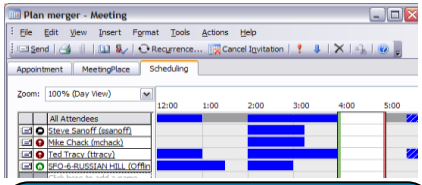
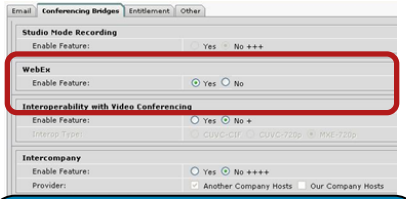
Cisco TelePresence WebEx OneTouch

Scheduling a Meeting

Standard User

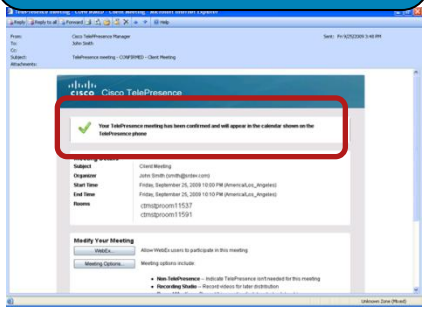


1) Schedule the CTS End Points

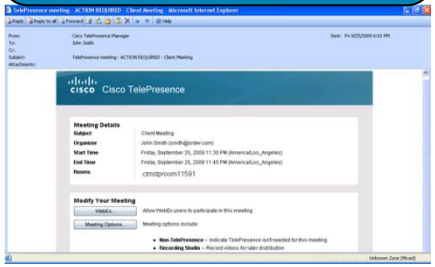


3) Login CTS-MAN Enable WebEx Meeting

4) CTS-MAN Email with WebEx URL and Details


Cisco TelePresence
Your TelePresence meeting has been confirmed and will appear in the calendar shown on the TelePresence phone
Meeting Details
Modify Your Meeting

2) Confirmation Email with Allow WebEx Link



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Cisco TelePresence WebEx OneTouch
Policy Based Scheduling

CTS-MAN administrators can set WebEx use policy

Premium User	Standard User	No WebEx Account
webex™	webex™	webex™
ALWAYS ON	**ENABLE PER MEETING**	**NO WEBEX ACCESS**

Roles can be added in CTS-MAN under Access Management

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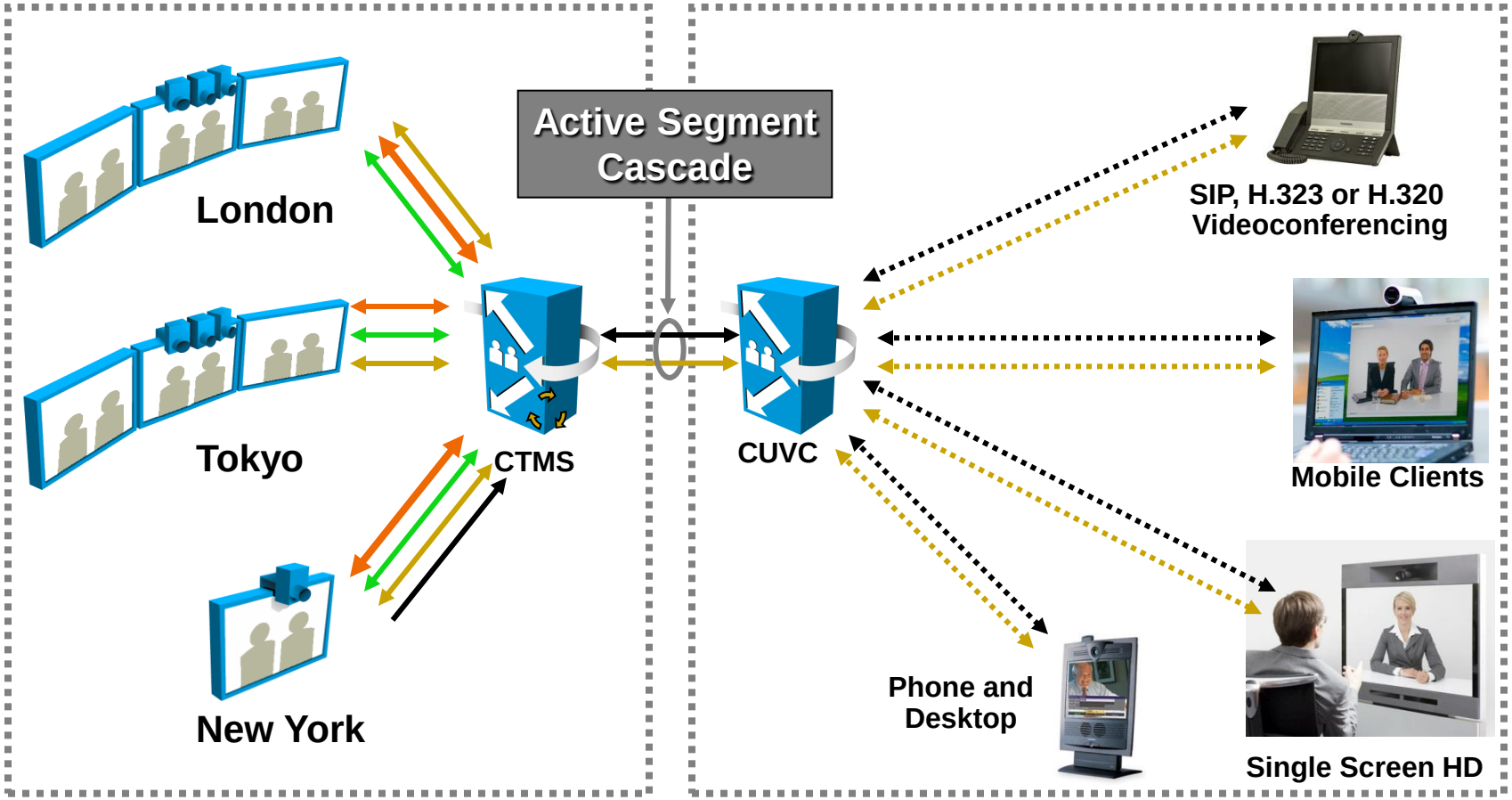
Cisco Immersive TelePresence in the Enterprise

Interoperability - CUVC



- H.264 720p
- AAC-LD
- G.722
- Any video format CUVC supports
- Any audio format CUVC supports

1. All CTS endpoints negotiate down to 720p when joining the meeting, and send a copy of their audio in G.722 format
2. CTMS determines which CTS segment is emitting the most dominant audio
3. CTMS mixes the G.722 channels from all CTS endpoints into a single G.722 channel and switches 720p and G.722 over to the CUVC

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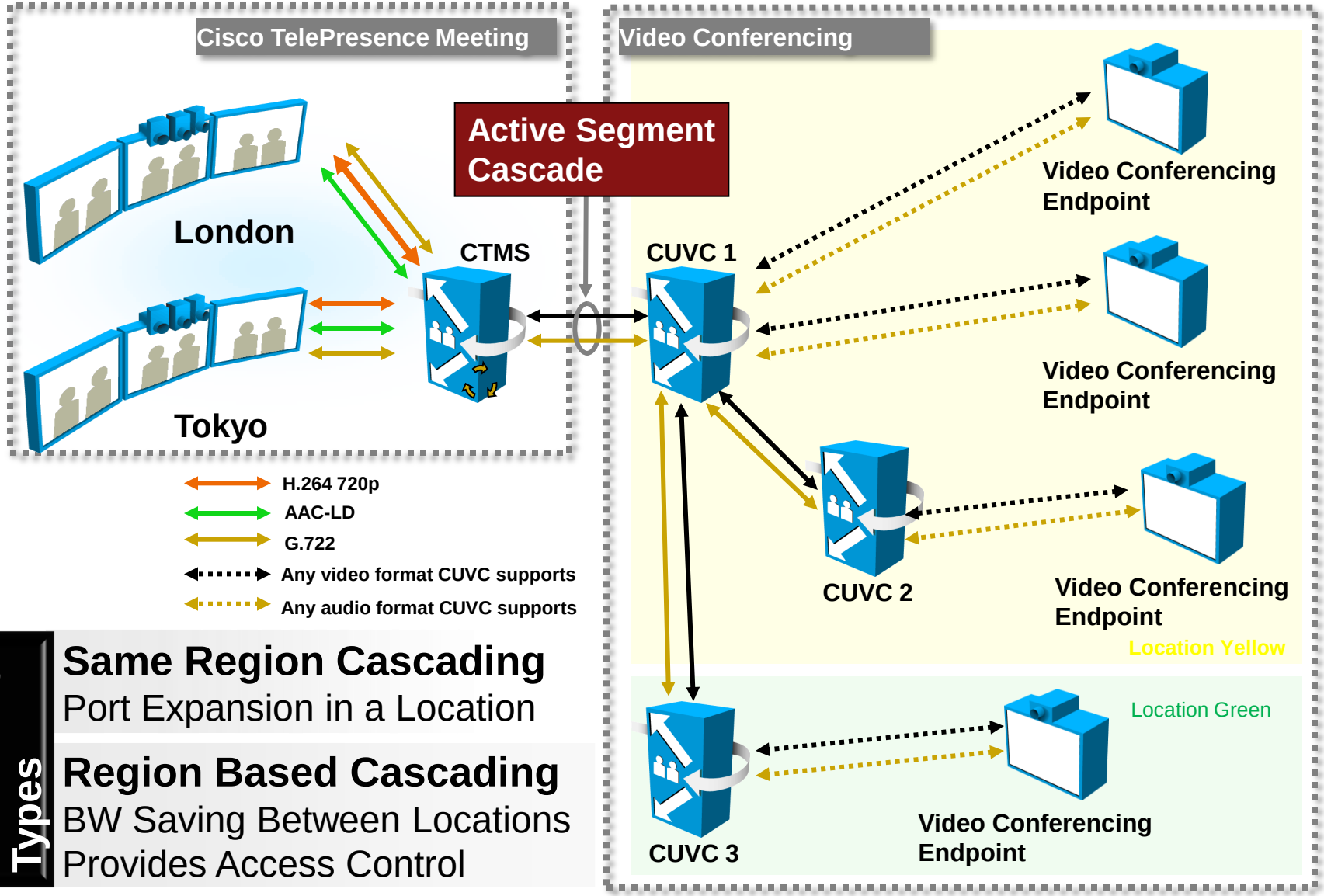
Cisco TelePresence Interoperability

Multi-CUVC Support – Media Illustration



Cascading Types

Same Region Cascading
Port Expansion in a Location

Region Based Cascading
BW Saving Between Locations
Provides Access Control

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Cisco Immersive TelePresence in the Enterprise

Interoperability – CUVC (user experience)

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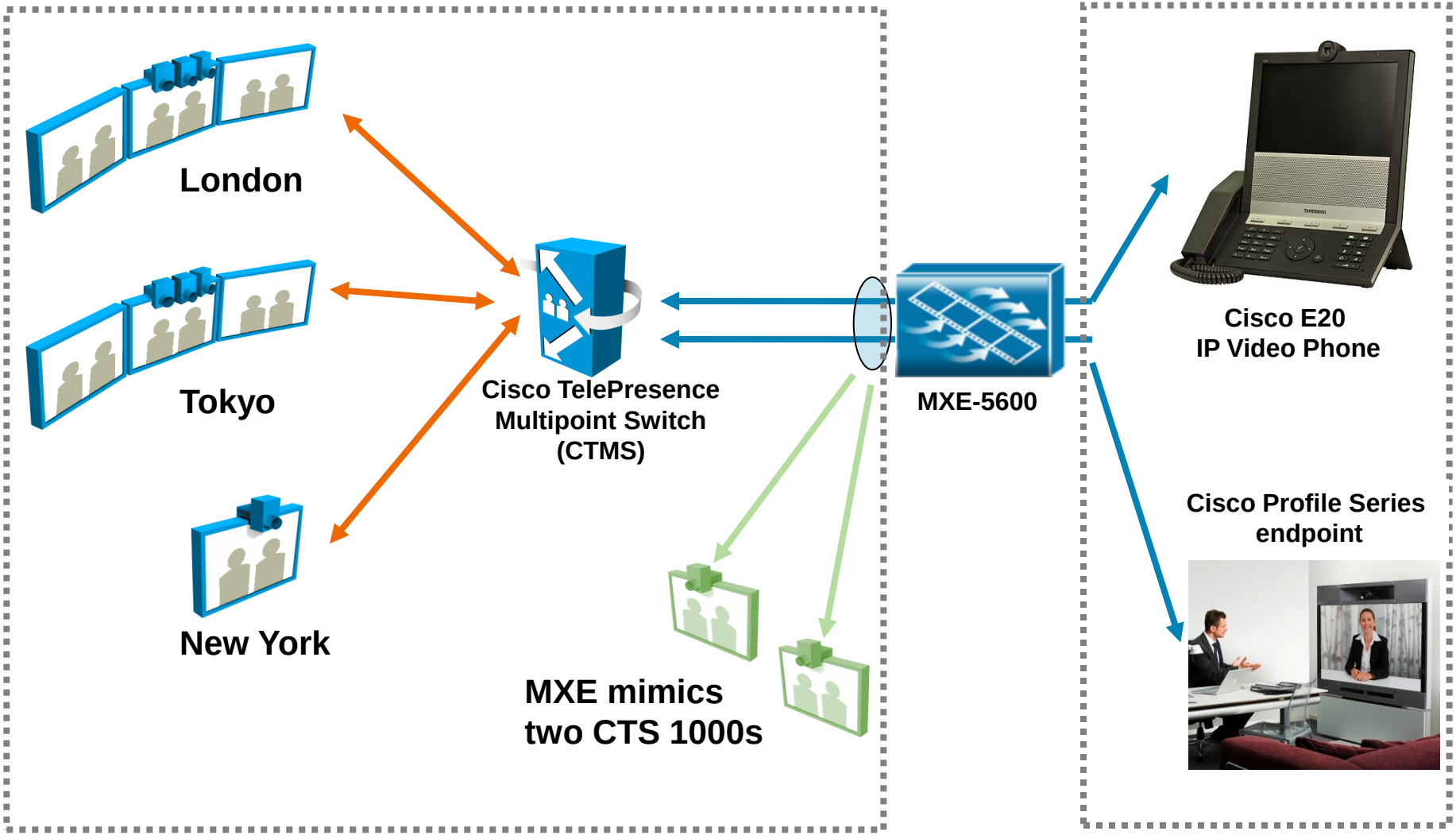
Cisco Immersive TelePresence in the Enterprise

Interoperability – MXE-5600



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Interoperability – MXE-5600 (user experience)

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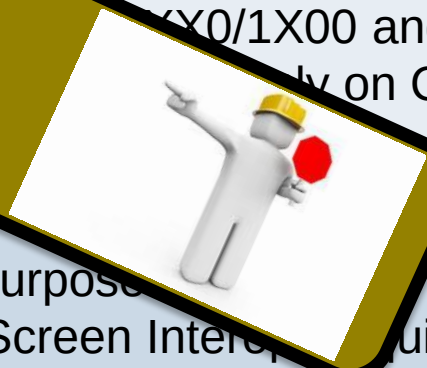
Cisco TelePresence Interoperability
Deployment Option Summary

Deploy… Opt…	…dvatange / Disadvantage	Deployment Case
CUVC	…VC endpoints …sers - …	Flexible Site Bandwidth and Port Availability with Cascading
MXE	- Transparent … - Leverage CUCM … - Low Latency - WebEx OneTouch (CTS 1.7.1…) - Complex Configuration	…X0/1X00 and 500 …y on CTMS
TelePresence Server	- Native Platform Support - Supports Single/Multi-Screen - Limited scalability (today) for VC	- All Purpose… - 3 x Screen Intero… …uired

For more information please consult session "Integration Scenarios for TelePresence Collaboration" (BRKEVT-2306)



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Cisco Immersive TelePresence AGENDA

- Introduction to Immersive TelePresence
- Selecting and evaluating rooms
- System Components
- Scheduling
- Media Services for TelePresence
- Planning and preparing the network
  - Is the network ready?

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Cisco Immersive TelePresence in the Enterprise

Network Design

Converged Network

Overlay (dedicated) Network

- Maximum Return on Investment, lowest Total Cost of Ownership in the long run
- Must follow network design guidelines
  - Switch platforms, line cards
  - Router platforms
  - WAN bandwidth/queuing policies
  - Shaping, queuing policies
  - 33% recommendation

- Quicker, tactical option
- Easier, cheaper in the short run
- Less concern of impact on current network
- Relaxed network design guidelines
- Overlay now, converge when you're ready

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Cisco Immersive TelePresence in the Enterprise

Network Design

Metric	Cisco Immersive TelePresence	Comments
Bandwidth	2 Mbps to 12.5 Mbps	+ 20% for Layer 2-4 overhead
Frame Rate	Fixed 30fps	Cisco Immersive TelePresence keeps frame rate at 30fps regardless of motion to preserve user experience
Latency	150–200 ms	Cisco Immersive TelePresence considers latency a critical element of the user experience
Jitter	50 ms	Cisco Immersive TelePresence seeks to keep jitter buffers as low as possible to keep latency to a minimum
Loss	0.05%	Cisco Immersive TelePresence has a very high compression ratio, which means keeping loss to an absolute minimum

Cisco TelePresence SRND

http://www.cisco.com/en/US/solutions/ns340/ns414/ns742/ns819/landing_vid_tPresence.html

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Cisco Immersive TelePresence in the Enterprise

Network Design

Application	L3 Classification		IETF
	PHB	DSCP	RFC
Network Control	CS6	48	RFC 2474
VoIP Telephony	EF	46	RFC 3246
Broadcast Video	CS5	40	RFC 2474
Multimedia Conferencing	AF41	34	RFC 2597
Real-Time Interactive / TelePresence	CS4	32	RFC 2474
Multimedia Streaming	AF31	26	RFC 2597
Call-Signaling	CS3	24	RFC 2474
Low-Lat			
Operat			
High-T			
Best Ef			
Low-Priority / Scavenger Data	CS1	8	RFC 3662

For more information please consult session ”Network Infrastructure Designs for Video Collaboration” (BRKEVT-2923)

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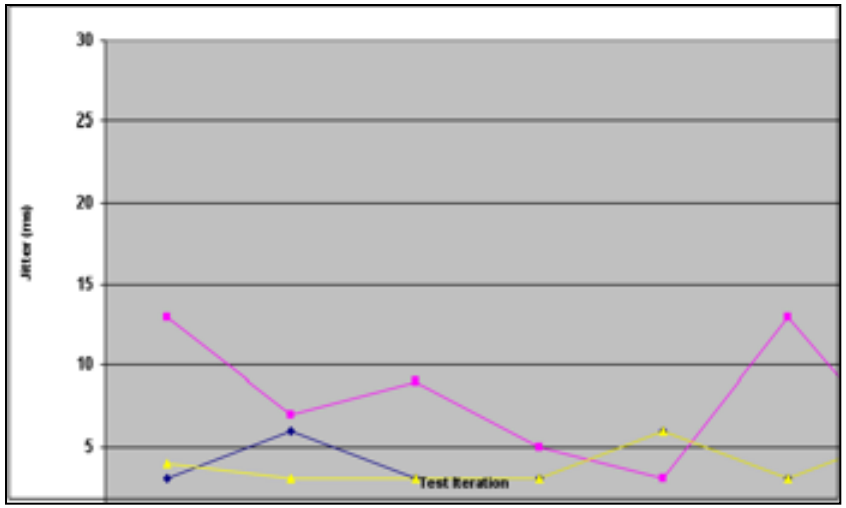
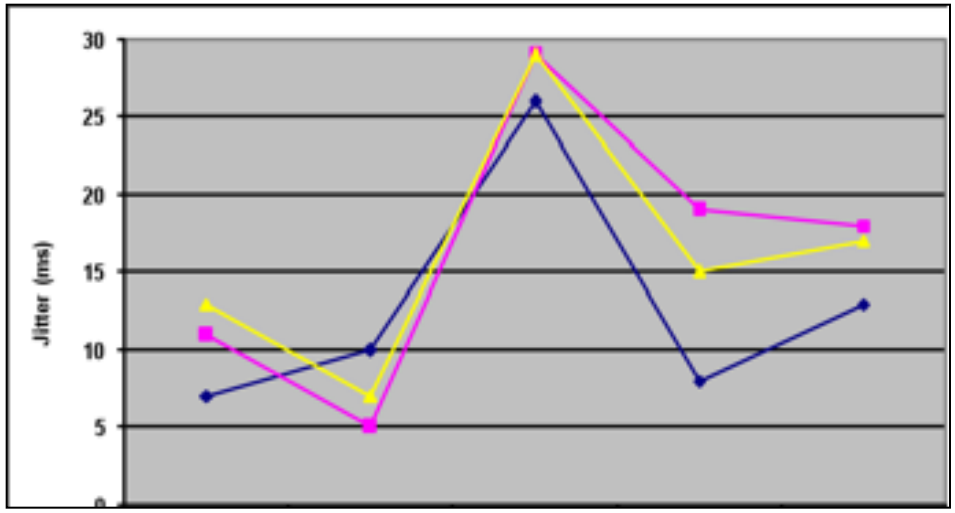
Cisco Immersive TelePresence in the Enterprise

Network Design

- One contributor to video frame jitter is the queuing and shaping algorithms on every interface along the path
- CBWQ has more latency
- Weighted-Fair Queuing produces higher jitter than Priority Queuing (in LLQ)
- LLQ is not mandatory if there is enough margin for latency and jitter



TelePresence ➔ LLQ



TelePresence ➔ CBWFQ

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Cisco Immersive TelePresence in the Enterprise

Bandwidth

Maximum Bandwidth Consumption Per Second								
Resolution		1080p	1080p	1080p	720p	720p	720p	720p
Motion Handling		Best	Better	Good	Best	Better	Good	Lite
Video per Screen (kbps)		4000	3500	3000	2250	1500	1000	936
Audio per Microphone (kbps)		64	64	64	64	64	64	64
Auto Collaborate Video channel		500	500	500	500	500	500	100
Auto Collaborate Audio channel (kbps)		64	64	64	64	64	64	64
CTS-1000 / CTS-500	Tx	4,628	4,128	3,628	2,878	2,128	1,628	1,164
Total Audio and Video (kbps)	Rx	4,756	4,256	3,756	3,006	2,256	1,756	1,292
CTS-3000 / CTS-3200 Total Audio and Video (kbps)		12,756	11,256	9,756	7,506	5,256	3,756	
+ 20% for Layer 2-4 overhead								
CTS-1000 / CTS-500 *max* bandwidth (kbps)	Tx	5,554	4,954	4,354	3,454	2,554	1,954	1,397
includes Layer 2- 4 overhead	Rx	5,707	5,107	4,507	3,607	2,707	2,107	1,550
CTS-3000 / CTS-3200 *max* bandwidth (kbps) *includes Layer 2- 4 overhead*		15,307	13,507	11,707	9,007	6,307	4,507	

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Cisco TelePresence over T1/E1

720p Lite Summary

Not really applicable for Immersive TelePresence !

Quality (per Display)*
Highest Detail, Best Motion: 1080p
Highest Detail, Best Motion: 1080p
Highest Detail, Better Motion: 1080p
Highest Detail, Good Motion: 1080p
High Detail, Best Motion: 720p
High Detail, Better Motion: 720p
High Detail, Good Motion: 720p
High Detail, Limited Motion: 720p (Lite)

- **New Video Quality on Endpoints**
  - Higher Main Video Compression
  - Auto Collaborate @ 1fps
  - (2 seconds to converge)
- **Supports Single T1 / E1**
- **No More than one Active Call**
  - Can't Initiate Audio Add-in
- **Only Interoperates with Release 1.6+ Devices**

Maximum Bandwidth Consumption Per Second			
Resolution		720p	720p
Motion Handling		Good	Lite
Video per Screen (kbps)		1000	936
Audio per Microphone (kbps)		64	64
Auto Collaborate Video channel		500	100
Auto Collaborate Audio channel (kbps)		64	64
CTS-1000 / CTS-500	Tx	1,628	1,164
Total Audio and Video (kbps)	Rx	1,756	1,292
CTS-3000 / CTS-3200 Total Audio and Video (kbps)		3,756	
+ 20% for Layer 2-4 overhead			
CTS-1000 / CTS-500 *max* bandwidth (kbps)	Tx	1,954	1,397
includes Layer 2- 4 overhead	Rx	2,107	1,550
CTS-3000 / CTS-3200 *max* bandwidth (kbps) *includes Layer 2- 4 overhead*		4,507	

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Cisco Immersive TelePresence in the Enterprise - SUMMARY

Quality

- Ultra-high definition (1080p)
- Spatial audio
- Virtually an in-person experience

Simplicity

- One button to push
- Easy to use—for executives and everyone

Reliability

- Resilient
- Secure

Network as the Platform

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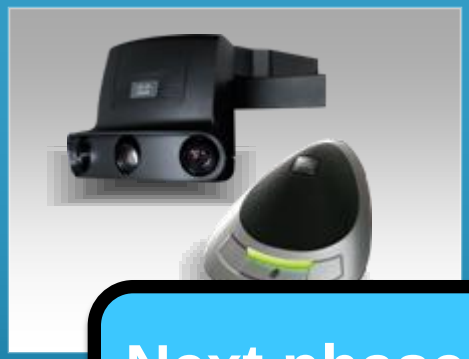
Cisco Immersive TelePresence in the Enterprise - SUMMARY



- Ultra-high de[illegible]ition (1080p)
- Spatial audio
- Vi[illegible] pe[illegible]

- One button to push
- Easy to use—for [illegible]utives and

- Resilient
- Secure

Next phase:

B2B to meet with Business Partners and Vendors

For more information please consult session "Designing Enterprise TelePresence Video for Business to Business Communication" (BRKEVT-2314)

Network as the Platform

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Cisco TelePresence in the Enterprise

References

Cisco TelePresence SRND

- http://www.cisco.com/en/US/solutions/ns340/ns414/ns742/ns819/landing_vid_tPresence.html

Cisco TelePresence Fundamentals

- http://www.ciscopress.com/bookstore/product.asp?isbn=1587055937

Cisco TelePresence Website

- http://www.cisco.com/telepresence

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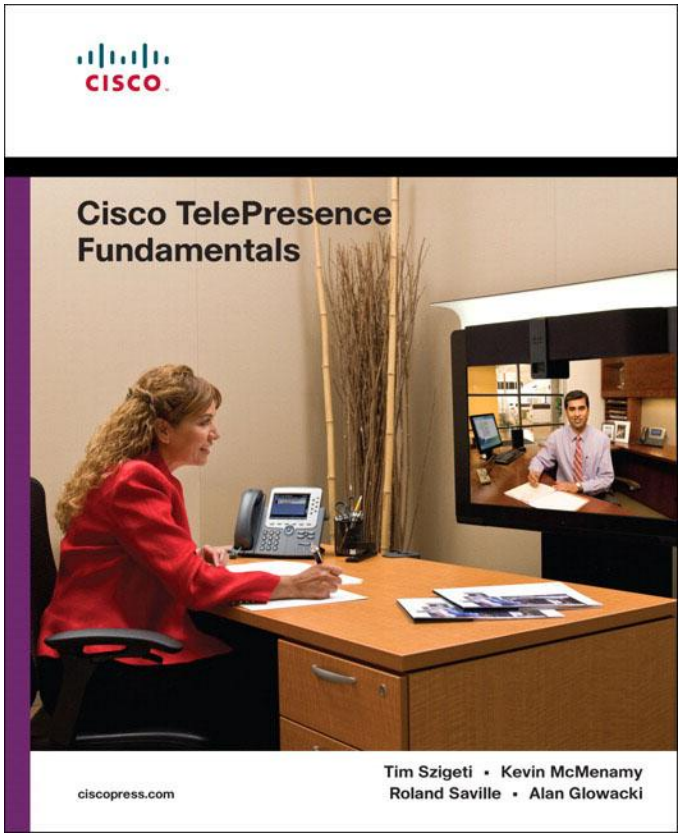
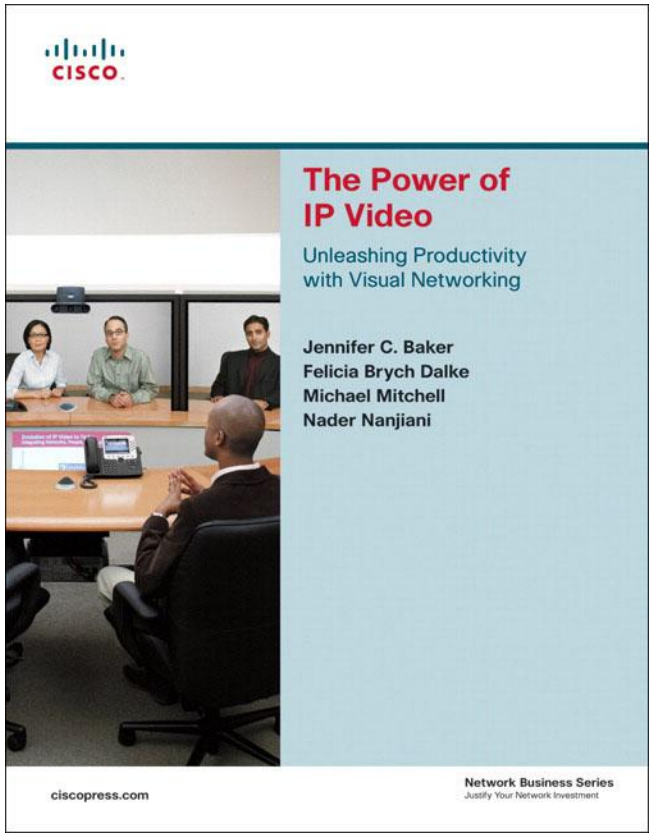
BRKEVT-2312

Recommended Reading





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  2. Login
  3. Complete and Submit the evaluation

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